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NOTA LEPIDOPTEROLOGICA

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Janusz Wojtusiak

1942 – 2012

Janusz Wojtusiak was born in 1942 in Kraków, Poland. Since early childhood, he was fascinated by nature, and particularly butterflies. Beyond any doubt, this interest was instilled in him by his father, the well-known Polish biologist, Roman Wojtusiak, Professor at the Jagiellonian University. With his father he observed and collected butterflies in then extremely rich and diversified locations around Kraków, such as Podgórki Tynieckie, Kostrze, Ojców and the Niepołomicka Forest, as well as during summer vacations in their favourite Kościelisko locality and in Podhale and the Tatra Mts.

He began his biological studies at the Jagiellonian University in 1959. During his studies he was very active in the academic life – he organised the Club of Young Naturalists, led a number of speleological expeditions in the Polish Jura and Tatra Mts., and led scientific camps for students. After graduating in 1964, he was employed as an Assistant in the Department of Systematic Zoology and Zoogeography under the leaderships of Professor Stanisław Smreczyński. Throughout the 1960s and in the early 1970s he was particularly involved in the activities of the Polish Mountaineering Association, driven, as he himself put it, by his affection for mountains and by the desire to go beyond the border into the unknown. In 1966 and 1967 and in 1973 he participated in the first Polish climbing expeditions in the Hindu Kush Mts. in Afghanistan and in Kashmir in Pakistan. During these expeditions, Janusz amassed a rich and ex-

tremely valuable collection of butterflies including several thousands of rare specimens of *Parnassius*, as well as *Baltia* whites and *Karanasa* satyrines. As Janusz recalled, when other members of the expeditions were occupied with climbing the snow-covered peaks, he was rather interested in penetrating the high-mountain valleys in search of interesting insects. The material brought from these expeditions enriched the collection of the Zoological Museum of the Jagiellonian University. During expeditions to Asia, he also shot many hours of documentary films that have recently been converted into digital format.

His Ph.D. thesis, presented in 1971, concerned the morphology of microlepidopterans from the family Adelidae and was one of the pioneering studies of this group. He described in detail and illustrated the female copulatory apparatus of adelids, together with its associated musculature. Soon after gaining the title of *doctor habilitatus* at the beginning of the 1980s, he was appointed Head of the Zoological Museum of the Jagiellonian University. Immediately afterwards, he was offered a contract to teach at a university in Nigeria, which, in these difficult times, provided him with a rare opportunity to receive a decent salary as a Polish academic teacher. Between 1982 and 1986, Janusz taught zoology and entomology at the University of Nigeria in Nsukka. Throughout that period, he spent almost all his free time undertaking excursions into forests and savannas looking for interesting film footage and insects for the scientific collection of the Zoological Museum. The material collected by him, principally in southeastern Nigeria, in the Nsukka and Okomu forests, as well as the Obudu and Oban mountains, includes thousands of specimens and is one of the most exhaustive collections of butterflies and moths from this region in the world. Many specimens constituted species new to science, described later by specialists in various groups, and the number of type specimens deposited in Kraków elevated the scientific value of the collection at the Jagiellonian. Another scientific result of his stay in Nigeria was the description of a new morphological organ in the ants of the genus *Oecophylla*, namely pretarsal pads, which allow these insects to push large prey on smooth and almost vertical surfaces.

After returning from Nigeria, Janusz continued his research in the field of entomology. His interests focused on circadian cycles in insects, various aspects of the behaviour of social insects such as ants, bees, and termites, as well as issues in taxonomy and the faunistics of butterflies.

In 1989 and 1990 he gave lectures in forest entomology at the invitation of the University of Wisconsin in Stevens Point. At that time he started an active co-operation with the leading zoological museums in Europe and the United States, above all with the Natural History Museum in London. This project aimed at producing a comprehensive work detailing the scientific collection of butterflies in the Zoological Museum of the Jagiellonian University. In 1991, he published a textbook on the ethology of insects, which is the only such comprehensive treatment of this topic in the Polish language to date. For several years, Janusz continued his studies aimed at updating and publishing a new edition of this textbook, but these plans were thwarted by his illness. At the turn of the 1980s and 1990s he again collected butterflies in tropical countries on several occasions: in India and Tanzania, and under the scientific programme of the Zoological Museum in Sao Tome and Principe. The latter expeditions have again resulted in very

interesting scientific material serving as a source for a number of scientific publications concerning, *inter alia,* fauna, and taxonomy, including new species, as well as various aspects of the biology and ecology of butterflies of that region.

In 1994, Janusz received a professorial nomination from the President of the Republic of Poland, Lech Wałęsa. Fom the mid 1990s, the scientific interests of Professor Janusz Wojtusiak were geared towards the mountainous areas of South America, as he noticed the hidden scientific potential in the mostly unknown fauna of many groups of butterflies of this region. From 1996 he either participated in or organised more than ten scientific expeditions into the Andes: in 1996 into the Cordillera de Merida in Venezuela; in 1997 to western Colombia; in 1998 to northern Peru; in 2000 and again in 2008 to Bolivia; in 2002 to central Peru; several times to Ecuador from 2002 to 2004, under the project sponsored by the State Committee for Scientific Research (KBN); and in 2007 again to Venezuela. During these scientific expeditions, extraordinarily valuable and extensive material of a large number of various lepidopteran groups across the whole order were collected, which resulted in more than 100 scientific publications and descriptions of more than 400 new species of butterflies and moths, principally belonging to Tortricidae, in co-authorship with Professor Józef Razowski. Together with the latter, Janusz described a new olfactory organ located on the abdomen of the African representatives of Adelidae. One of his most interesting achievements was discovering and describing the first brachypterous and non-flying male moth in the world, in the genus *Xenomigia* (Notodontidae).

Janusz was the initiator of research and teaching co-operation agreements between the Jagiellonian University and several leading scientific institutions and universities in South America, including the Venezuelan Institute for Scientific Research and the National University of San Marcos in Lima. These agreements facilitated to a great extent the research activities of scientific staff, doctoral students, and undergraduates of the Jagiellonian University, carried out in the almost uncharted mountainous forests of this continent. The exploration of the Andes placed the Zoological Museum on the list of the most highly regarded museums and research institutions in Europe with respect to the studies of butterfly fauna and global biodiversity.

Janusz was an academic teacher highly regarded and well liked by his students. For many years he had taught the ethology of insects, zoogeography, and entomological techniques. Since 2007 he had co-organised and was one of the lecturers in Tropical Ecology, a course whose fieldwork component was being undertaken each year in Venezuela – first such course in Poland. In recent years he devoted much time to his new hobby, making films about nature. He shot and edited many hours of documentaries that are used as teaching aids and in the promotional activities of the Jagiellonian University.

He filled his free time with making field excursions in the Tatras, Alps, and Rocky Mountains, from which he always brought back interesting insect specimens. Janusz was a very active advocate for the establishment of a new chair at the Zoological Museum of the Jagiellonian University and for creating a modern basis for teaching within the Centre for Natural Sciences Education, whose planning he supervised as a senior consultant.

Tomasz W. Pyrcz

Redescription of *Pelochrista maculiferana* (Kennel, 1900), bona sp., with notes on eight poorly known species of leaf-rollers from the Volgo-Ural region (Lepidoptera: Tortricidae)

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Abstract. The status of *Pelochrista maculiferana* (Kennel, 1900), bona sp., comb. nov., which was until now considered a synonym of *Epiblema junctanum* (Herrich-Schäffer, 1856), is revised and this species, now considered a good species, is redescribed. Additionally, notes on eight poorly known species of Tortricidae from the Volgo-Ural region are provided. *Lobesia subherculeana* (Filipjev, 1924), *Asketria lepta* Falkovitsh, 1964, *Eucosma pergratana* (Rebel, 1914), and *Dichrorampha alaicana* (Rebel, 1910) are reported as new to Europe, and *Eucosma medvedevi* (Gerasimov, 1928), *Clepsis nybomi* (Hackman, 1950), and *Asketria lepta* Falkovitsh, 1964 as new to Russia. The adults of seven of these species and the genitalia of four of them are illustrated.

Introduction

The leaf-roller (Tortricidae) fauna of the Volgo-Ural region is moderately well known. Eversmann (1844) made thorough faunistic investigations mainly in the southern Urals in the middle of the 19th century and listed 132 species of Tortricidae for this region. The vicinity of Sarepta in the Lower Volga region was intensively studied at the end of the 19th century by Hugo Christoph (Amsel 1964) and some other entomologists, and numerous new species were described from there (Christoph 1872; Kennel 1900; Staudinger 1871, 1877). From the beginning of the 20th century there have been no serious studies of microlepidoptera in the Volgo-Ural region until 1996, when research in the southern Urals was commenced by the author and several colleagues. The majority of the findings from about 30 expeditions made between 1996 and 2011 in the region remain unpublished. Anikin et al. (2006) summarised the data on Tortricidae from the Volgo-Ural region, which include 510 species. However, their list lacks several species recently recorded in the steppes of the southern Urals. In the present article, faunistic and/or taxonomically significant new records of nine species of Tortricidae from the region are reported.

Material and methods

This contribution is based on material collected by the author during 1996–2006 on about 30 expeditions to the southern Urals and the Lower Volga region, three of them joint with Timo Nupponen. The material was collected both by artificial light (ultraviolet tube lamps: Philips TL K 40W/ 09N, Sylvania blacklight 20W & 40W/350 BL; solar lamp Osram Ultra Vitalux 300W) at night and by netting and sweeping during the daytime. The material is deposited in the private collection of T. & K. Nupponen. The

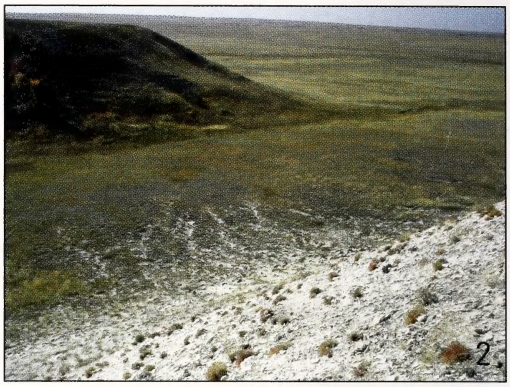


Fig. 1. Rocky steppe slopes in Guberlinsky Mountains, the southern Ural range, Russia. Habitat of *Pelochrista maculiferana* (Kenn.). **Fig. 2.** Chalk steppe in Schibendy Valley, the southern Ural range, Russia. Habitat of *Asketria lepta* Flkv. and *Lobesia subherculeana* (Fil.). (Photos: K. Nupponen).

following abbreviation is used in the text: ZIN (Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia).

Systematics

Pelochrista maculiferana (Kennel) was described from a single male specimen collected in the Guberlinsky Mountains, South Ural in 1892. No additional specimens have been reported since. Razowski (1999: 481) synonymised *maculiferana* with *Epiblema junctanum* (Herrich-Schäffer, 1856), and this opinion was followed in several subsequent publications (e.g., Razowski 2001, 2003; Sinev & Nedoshivina 2008; Lepiforum 2011).

During an expedition to the southern Urals in late June 2003, I collected two male specimens of a peculiar small tortricid moth in the Guberlinsky Mountains, Orenburg district. After dissecting one of them, it became obvious that the genitalia exhibited characteristics typical for the genus *Pelochrista* (see Razowski 2003). However, I was unable to find a comparable illustration in the literature. A few years later, I studied leafrollers in the collection of ZIN with special attention to two specimens of *Pelochrista maculiferana*, which were externally identical to the newly-collected specimens from southern Ural and were collected from the same locality. The specimens were not dissected, but the valvae of the holotype were sufficiently exposed to see the essential characteristics (see below). Based on facies and male genitalia, these two specimens are undoubtedly conspecific with the holotype of *maculiferana*.

The labels of the type specimens of *P. maculiferana* are somewhat confusing. The description is based on a single specimen labelled "Guberli, 19.6.1892, Christoph [leg.]". The holotype in ZIN lacks the label with date and collector, and the red holotype label is not the original one. The second specimen is labelled as paratype, but no paratypes were designated by Kennel (1900).

The habitats in the Guberlinsky Mountains are steppe hills with steep, xerothermic rocky slopes (Fig. 1). The recently-collected specimens were swept in late afternoon

Fig. 3. Imago of *Pelochrista maculiferana* (Kenn.) (male, holotype; S Ural; ex. coll. ZIN). Scale = 5 mm.

from *Inula salicina* L. (Asteraceae), which is reported as a host plant for *E. junctanum* (Buhl et al. 1999). The known specimens of *P. maculiferana* have been observed in the second half of June, but the flight period probably extends into mid-July. The species is known only from the type locality, the Guberlinsky Mountains in the southern Ural range. The redescription of the moth and description of the male genitalia are given below.

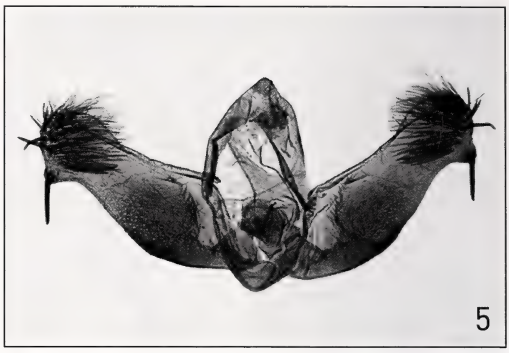
Pelochrista maculiferana (Kennel, 1900), bona sp., comb. nov.

Epiblema maculiferana Kennel, 1900, Dt. ent. Z. Iris 13: 152, pl. 5 fig. 28.
Epiblema junctanum (Herrich-Schäffer, 1856), auct. Razowski 2003, nec. Kennel 1900.

Material. Holotype ♂, **Russia**, '♂ | Guberli <white label with black edges>; coll. of Grand Duke | Nikolai | Mikhailovich [Romanov] <white label, text in Russian>; Holotypus | Epiblema | maculiferana (Kenn.) <red label>; Photograph | Marek Kopeć <blue label>' (ZIN). – Paratype: ♂, same data (ZIN). – Other material: 2♂♂, Russia, S Ural, Orenburg district, 51°15'N 58°08'E, 340 m, Orsk 40 km W, near Guberlja village, 26.vi.2003, leg. K. Nupponen. Genitalia slide: K. Nupponen prep. no. 1/2.i.2005.

Diagnosis. *P. maculiferana* is rather easily distinguished from other known species of the genus *Pelochrista* both externally and by the characters in the male genitalia. The moth is small, and the rusty brown forewings with a distinct dorsal patch surrounded by large dark blotches are characteristic. The male genitalia are unmistakeable, and readily separated from the other known species of *Pelochrista* by a very thick neck of the valva and a rounded cucullus with one ventral and two distal spines. In the original description of *P. maculiferana*, the species was compared to *E. junctanum.* In the latter species, the forewings are greyish or fuscous, the dorsal patch is wider and not divided into two areas, the dorsal blotches are smaller and blackish, the hindwings are much paler, and the male genitalia are completely different.

Redescription (Figs 3, 4). Head: Vertex rusty brown; antenna concolourous; labial palp yellowish brown, inner surface paler. Thorax: Tegulae, collar, and thorax rusty brown. Legs pale rusty brown, hindlegs paler. Wingspan: 12.0–12.5 mm. Forewing with costal fold to 1/3, basally broad, apex rather pointed; ground colour rusty brown,



Figs 4–5. *Pelochrista maculiferana* (Kenn.). **4.** Male, wingspan 12 mm (S Ural, Guberli 26.vi.2003). **5.** Male genitalia (S Ural; slide KN 1/02.i.2005).

scattered black scales over wing surface, more frequently in distal fourth; dorsal patch dirty white, consisting of two parallel lines angled outwards, reaching mid-wing; dorso-postbasal and tornal blotches dark brown, latter somewhat extended; apical half of costa with distinct strigulae; inner spots of speculum indistinct; cilia line blackish, fringe paler than forewing. Hindwing dark fuscous, cilia line distinct, fringe paler than wing. Underside of wings unicolourous fuscous, except costa of forewing pale yellowish brown. Abdomen: Dark fuscous. Male genitalia (Fig. 5) with uncus short, rounded. Socii rather long, bent and hairy. Tegumen 1.5 × higher than wide. Valva robust, ventral incision almost absent, neck thick; cucullus round and hairy, ventrally with long and stout spine; two further spines at middle of apical margin. Sacculus 0.4 × length of valva, caudal edge indistinct. Vinculum short and rounded. Phallus half length of valva, thick, slightly bent at 0.4, apical third tapered, cornuti absent (or lost during mating, but their sockets are invisible).

Records of eight species of Tortricidae

The dates and localities of records for each species are given, as well as the known distributional range and basic information about the bionomy. Data on the geographical range of the species are from Kuznetsov (1989), Kuznetsov et al. (1996), Razowski (2002, 2003), and Sinev & Nedoshivina (2008).

Phtheochroa exasperantana (Christoph, 1872) Fig. 6

Material. **Russia**, Astrahan district, 48°08–09'N 46°49–52'E, -15–100 m, Baskunzak salt lake SW, Bogdo Hill, 2♂♂, 26.viii.2006, 1♂, 28.viii.2006, leg. K. Nupponen; 47°34'N 47°01'E, -5 m, Sasykoli village 3 km NE, Peski Voniutchie, 3♀♀, 29.viii.2006, leg. K. Nupponen; 48°02–03'N 46°37–40'E, 5 m, Peski Thikili near Bogdo village, 2♂♂, 1♀, 30.viii.2006, leg. K. Nupponen.

Distribution. Russia (Lower Volga), Tajikistan; recently recorded from the Ustyurt range in SW Kazakhstan (K. Nupponen, unpublished).

Remarks. The species inhabits desert steppes and semideserts in the northern Caspian Sea region. The flight period extends from the last third of August to late September.

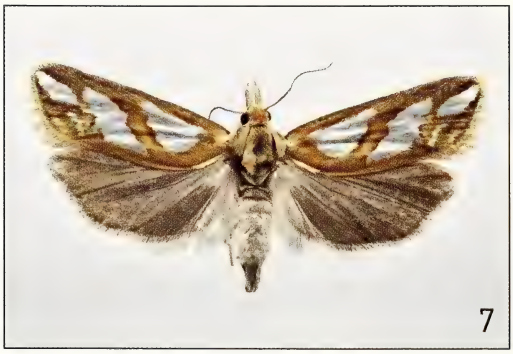


Fig. 6. *Phtheochroa exasperantana* (Christ.). Female, wingspan 16.5 mm; Lower Volga, near Bogdo 30.viii.2006). **Fig. 7.** *Eugnosta medvedevi* (Geras.). Female, wingspan 22 mm; Lower Volga, by Ilovla village 5.ix.2002).

The larva feeds on *Caroxylon laricinum* (Pall.) Tzvelev (Chenopodiaceae) (Anikin et al. 2006). *P. exasperantana* is easily distinguished from related species by its ochreous forewings with well-defined dark brown subterminal and median fasciae, the dorsal part of the latter is very broad forming a roundish blotch. The male and female genitalia are illustrated by Razowski (2002: pl. 6 fig. 58; pl. 44 fig. 58). The two adults illustrated by Razowski (2002: pl. IV figs 58 & 58a) as *P. exasperantana* are actually *P. krulikowskii* (Obraztsov, 1944). *P. exasperantana* has less elongated ochreous forewings, with a dorsally broad and subcostally cut off dark brown median fascia. Based on examination of a lot of material of both species (several hundreds of *P. krulikowskii* from S Ural, Lower Volga, and W Kazakhstan, and over 30 exx of *P. exasperantana* from Lower Volga and W Kazakhstan), it is clear that *P. krulikowskii* is externally a very variable species. It seems that specimens that are somewhat doubtful as to their identification are usually mottled forms of *P. krulikowskii*, and not *P. exasperantana*. With this on mind, the two species are fairly easy to separate from each other both by the external appearance and by the male genitalia.

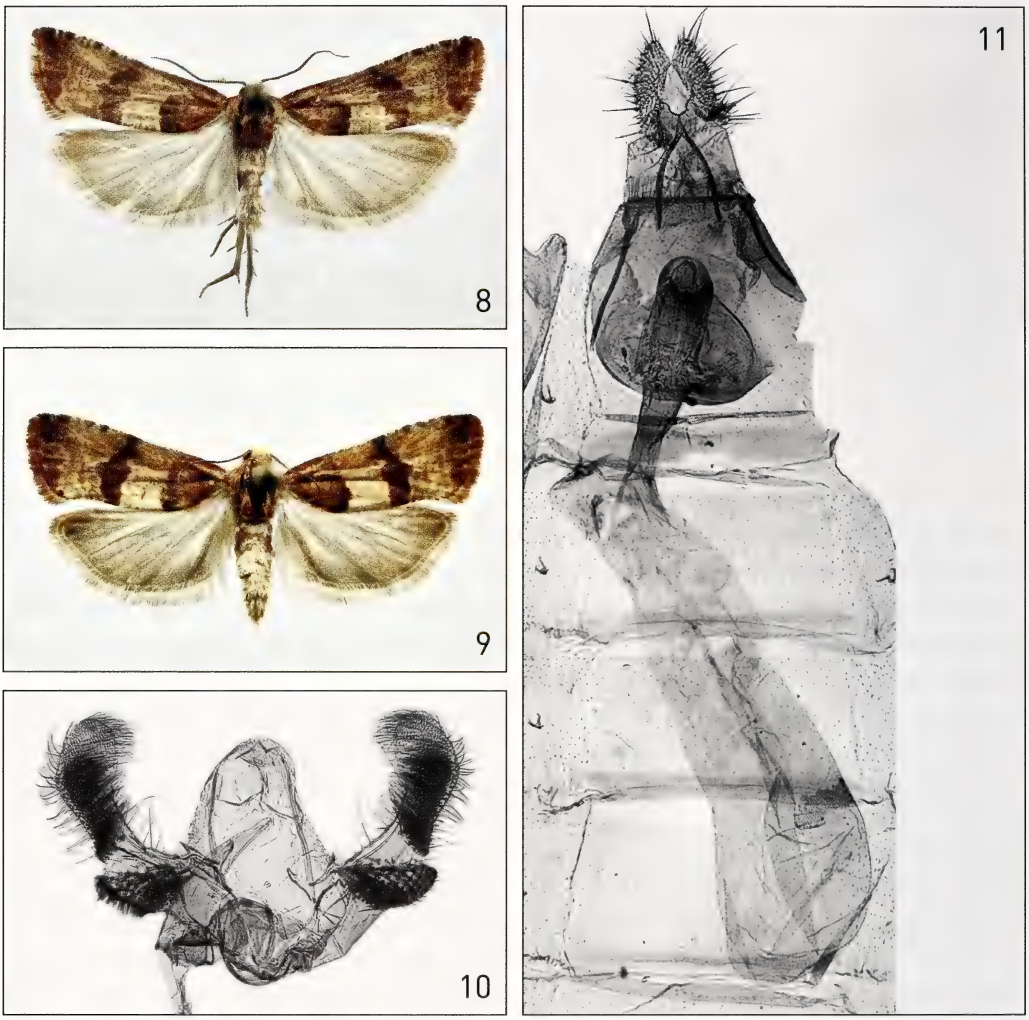
Eugnosta medvedevi (Gerasimov, 1928) Fig. 7

Material. **Russia**, Volgograd district, 49°14–19'N 43°43–56'E, 60 m, Ilovla village 10 km WSW, 20 exx, 5.ix.2002, leg. K. Nupponen.

Distribution. Ukraine, Russia (Lower Volga). New to Russia.
Remarks. This species was previously known only from the type series collected in eastern Ukraine. The habitat in the Russian locality is a sandy steppe. The moths are nocturnal and came to artificial light. The male and female genitalia are illustrated by Razowski (2002: pl. 14 fig. 136; pl. 50 fig. 136).

Clepsis nybomi (Hackman, 1950)

Material. **Russia**, S Ural, Bashkiria/Cheliabinsk district, 54°33'N 58°50'E, 900 m, Iremel Mountains, 1♂, 25.vi.1996, leg. K. Nupponen.



Figs 8–11. *Lobesia subherculeana* (Fil.). **8.** Male, wingspan 19 mm; S Ural, Schibendy Valley 7.vi.1998). **9.** Female, wingspan 19 mm; S Ural, Schibendy Valley 23.vi.1999). **10.** Male genitalia (S Ural; slide KN 1/8.i.2012). **11.** Female genitalia (S Ural; slide KN 2/5.i.2012).

Distribution. Finland, N Sweden, Russia (S Ural). First record outside Fennoscandia, new to Russia.

Remarks. The moth was observed at 0830 hr flying slowly about 1 m above the ground; it landed on a branch of *Picea abies* (L.) H. Karst. (Pinaceae). The habitat where it was collected is a taiga forest with luxurious lower vegetation. For further notes on the species, see Bengtsson (2004).

Lobesia subherculeana (Filipjev, 1924) Figs 8–11

Material. **Russia**, S Ural, Orenburg district, 50°40–41'N 54°27–28'E, 170–230 m, Pokrovka village 20 km S, Schibendy valley, 2♂♂, 7.vi.1998, 1♂, 21.vi.1999, 2♂♂, 22.vi.1999, 2♀♀, 23.vi.1999, leg. T. & K. Nupponen; Ibidem, 1♀, 2.vii.2003, 1♂, 21.viii.2006, leg. K. Nupponen; 51°22–23'N 56°48'E,

130–340 m, Donskoje village 4 km W, Verbljushka, 1♂, 27.viii.2000, 3♂♂, 28.viii.2000, 3♀♀, 9.ix.2002, 1♂, 27.vi.2003, 1♂, 28.vi.2003, 1♂, 2♀♀, 6.ix.2009, leg. K. Nupponen. Genitalia slides: K. Nupponen prep. no. 1/8.i.2012 (♂), 2/5.i.2012 (♀).

Distribution. Russia (Krasnojarsk district, Tuva Rep., S Ural). Recently recorded also from W Kazakhstan (K. Nupponen, unpublished). The present records are the westernmost, representing the first from the Urals and from Europe.
Remarks. Externally *L. subherculeana* resembles *L. indusiana* (Zeller, 1847), but the former is much larger (wingspan: range 14–20 mm, mainly 18–19 mm) and the forewing pattern elements have greater contrast. The moths were observed on xerothermic rocky steppe slopes (Fig. 2). The species occurs in two generations in June and from late August through first third of September.

Asketria lepta Falkovitsh, 1964 — Figs 12–15

Material. **Russia**, S Ural, Orenburg district, 50°40–41'N 54°27–28'E, 170–230 m, Pokrovka village 20 km S, Schibendy valley, 1♀, 1.vii.2003, 1♂, 2.vii.2003, 2♀♀, 3.viii.2005, 1♂, 20.viii.2006, leg. K. Nupponen. Genitalia slides: K. Nupponen prep. no. 2/11.x.2005 (♂); 1/5.i.2012 (♀).

Distribution. SE Kazakhstan, Mongolia, Russia (S Ural). New to Russia and Europe.
Remarks. This species inhabits chalk steppes in South Ural (Fig. 2). The flight period extends from late June into the second half of August, possibly representing two generations. Falkovitsh (1964) reported *Atraphaxis virgata* (Reg.) Krassn. (Polygonaceae) as a larval host plant.

Thiodia irinae Budashkin, 1990

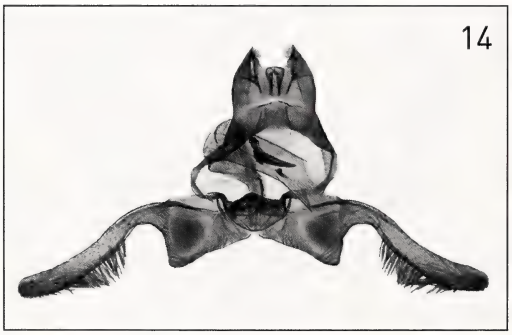
Material. **Russia**, S Ural, Orenburg district, 51°22–23'N 56°48'E, 130–340 m, Donskoje village 4 km W, Verbljushka, 1♀, 30.v.1998, leg. T. & K. Nupponen, genitalia preparation preserved in glycerol; Cheliabinsk district, 52°39'N 59°34'E, 320 m, Arkaim reserve near Amurskii village, 1♀, 15.vi.1999, leg. K. Nupponen.

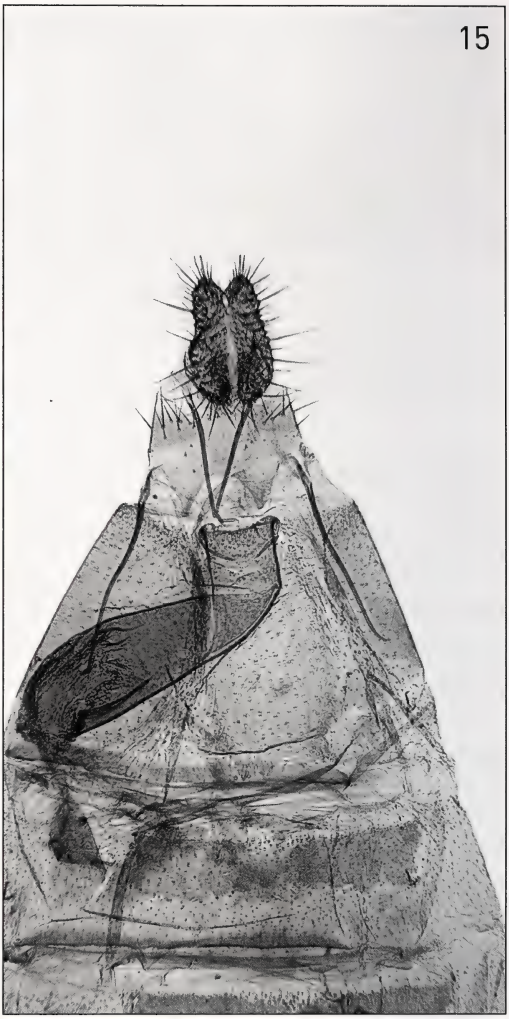
Distribution. Ukraine (Crimea), Russia (Lower Volga, S Ural). Recently recorded from W Kazakhstan (K. Nupponen, unpublished). The present records are the easternmost known and the first from the Urals.
Remarks. The larva feeds on leaves of *Galatella villosa* (L.) Rchb. f. (Asteraceae) (Razowski 2003). The adult and male and female genitalia are illustrated by Razowski (2003).

Eucosma pergratana (Rebel, 1914) — Fig. 16

Material. **Russia**, S Ural, Cheliabinsk district, 53°01'N 62°02'E, 185 m, Ajat River near Nikolaevka village, Sokolovskaja Gora, 1♀, 24.vii.1998, 1♀, 25.vii.1998, leg. K. Nupponen.

Distribution. Russia (Tuva Rep., Transbaikalia, S Ural), Kazakhstan, Kyrgyzstan, Mongolia, China. The present records are the westernmost known and the first from the Urals and Europe.
Remarks. The moths were observed on a xerothermic rocky steppe slope along a river. The male genitalia are illustrated by Kuznetsov (1989).





Figs 12–15. *Asketria lepta* Flkv. **12.** Male, wingspan 9 mm; S Ural, Schibendy Valley 20.viii.2006). **13.** Female, wingspan 11 mm; S Ural, Schibendy Valley 1.vii.2003). **14.** Male genitalia (S Ural; slide KN 2/11.x.2005). **15.** Female genitalia (S Ural; slide KN 1/5.i.2012).

Dichrorampha alaicana Rebel, 1910 — Figs 17–18

Material. **Russia**, S Ural, Cheliabinsk district, 53°56–57'N 59°03–04'E, 500–600 m, near Moskovo village, 1♂, 10.vii.1997, 1♂, 12.vii.1998, leg. K. Nupponen; Ibidem, 1♂, 26.V.1998, 1♂, 18.vi.1998, leg. T. & K. Nupponen. Genitalia slide: K. Nupponen prep. no. 3/5.i.2012 (♂).

Distribution. C Asia (mountain ranges of Kazakhstan, Kyrgyzstan and NW China), Russia (Altai, Tuva, S Ural). The present records are the westernmost known and the first from the Urals and Europe.

Remarks. The species occurs on rocky steppe slopes in the Urals. In Southern Siberia and Central Asia it inhabits steppes and dry meadows in mountain ranges.

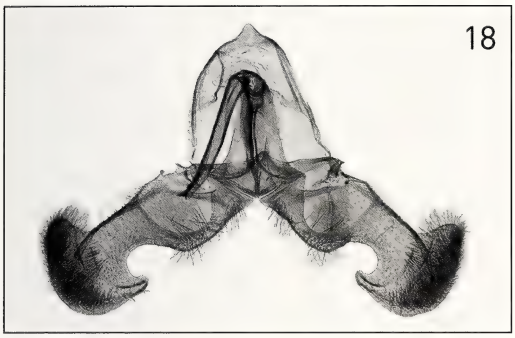


Fig. 16. *Eucosma pergratana* (Rbl.). Female, wingspan 17 mm (S Ural, Ajat River 25.viii.1998). **Figs 17–18.** *Dichrorampha alaicana* Rbl. **17.** Male, wingspan 16 mm (S Ural, Moskovo 26.v.1998). **18.** Male genitalia (S Ural; slide KN 3/5.i.2012).

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Revision of types of several species of *Bembecia* Hübner, 1819 from northern Africa and southwestern Europe (Sesiidae)

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Abstract. The type specimens of *Sesia sirphiformis* Lucas, 1849 from Lac Tonga in Algeria and *Dipsosphecia megillaeformis* v. *tunetana* Le Cerf, 1920 **syn. n.** from the vicinity of Tunis were examined and found to be conspecific. *Bembecia sirphiformis* belongs to the *B. ichneumoniformis* (Denis & Schiffermüller, 1775) species group and is currently known only from northern Africa. Records from Sicily, Sardinia, Corsica, southern Italy, and Morocco (as *B. tunetana*) are here considered doubtful and may belong to other species. *B. astragali* (Joannis, 1909) **stat. rev.**, which was described from northern Spain and southern France and was previously considered conspecific with *B. sirphiformis*, actually appears not to be so closely related to *B. sirphiformis* and seems to belong to the *B. megillaeformis* (Hübner, 1813) species group. *B. igueri* Bettag & Bläsius, 1998 **syn. n.** from Morocco is now considered to be a synonym of *B. astragali*.

Zusammenfassung. Die Typusexemplare von *Sesia sirphiformis* Lucas, 1849 vom Lac Tonga in Algerien und *Dipsosphecia megillaeformis* v. *tunetana* Le Cerf, 1920 **syn. n.** aus der Umgebung von Tunis wurden untersucht und ihre Artgleichheit festgestellt. *Bembecia sirphiformis* ist eine Art der *B. ichneumoniformis* (Denis & Schiffermüller, 1775) Artengruppe und bisher nur von Nordafrika bekannt. Meldungen von Sizilien, Sardinien, Korsika, Süditalien und Marokko (als *B. tunetana*) sind zweifelhaft und wahrscheinlich anderen Arten zuzuordnen. Die bisher als konspezifisch mit *B. sirphiformis* angesehene, aus Nordspanien und Südfrankreich beschriebene *B. astragali* (Joannis, 1909) **stat. rev.** ist nicht unmittelbar verwandt, sondern gehört der *B. megillaeformis* (Hübner, 1813) Artengruppe an. Synonym zu *B. astragali* ist *B. igueri* Bettag & Bläsius, 1998 **syn. n.** von Marokko.

Introduction

During the examination of Sesiidae types in the Muséum National d'Histoire Naturelle, Paris (MNHP), the author noticed a significant similarity between the type specimens of *Sesia sirphiformis* Lucas, 1849 and *Dipsosphecia megillaeformis* v. *tunetana* Le Cerf, 1920. This was also noted but not published by Ferdinand Le Cerf, documented by a handwritten label "*Dips. sirphiformis* Luc. v. *tunetana* Le Cerf, ♀ Type", which was added by Le Cerf to one of the primary types of *D. megillaeformis* v. *tunetana*. This specimen, a female, was later selected as lectotype by Špatenka (1992). The similarity between the two taxa, *sirphiformis* and *tunetana*, is in conflict with the current understanding of *S. sirphiformis*, which is considered conspecific with *Sesia astragali* Joannis, 1909 (Špatenka et al. 1993, 1999). Only two of three primary types of *D. megillaeformis* v. *tunetana*, a male and a female, were found in the MNHP and were examined by Špatenka (1992). He dissected the genitalia of the male, designated the female as lectotype and listed it as subspecies of *Bembecia albanensis* (Rebel, 1918). Several years later, the genitalia of the lectotype were also dissected and *Bembecia tunetana* was treated as a distinct species by Bettag & Bläsius (1999). In agreement with

this conclusion, *B. tunetana* is listed with species rank on the Fauna Europaea website with the comment suggesting that "... taxonomic research is needed". The aim of this paper is to clarify the identity of the taxa in question. Unless otherwise noted, the material examined is from the collection of the author.

Abbreviations and notation

MNHP	Muséum National d'Histoire Naturelle, Paris
NHMM	Naturhistorisches Museum Mainz
CRB	collection of Rolf Bläsius, Eppelheim, Germany
CDB	collection of the author

'21.vi./vii–viii.2005' means that larva(e) or pupa(e) were found on June 21 and the adults emerged in July and August.

Bembecia sirphiformis (Lucas, 1849) Figs 1–6, 13, 17

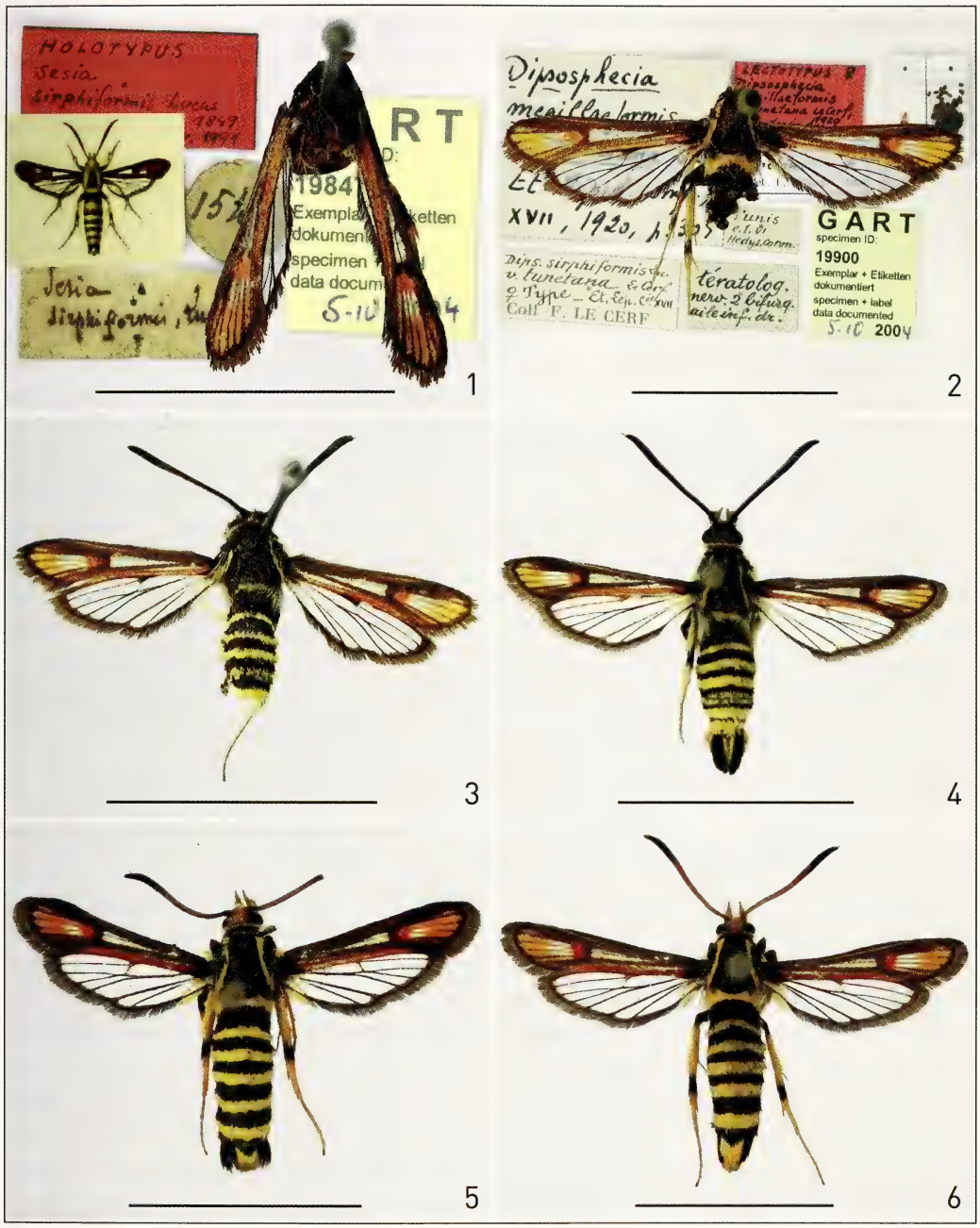
Sesia sirphiformis Lucas, 1849: 367. Syntype ♀ [without head and abdomen] (Fig. 1): "C'est en juin, dans les bois du lac Tonga, aux environs du cercle de Lacalle, que j'ai pris cette jolie petite espèce, dont je n'ai rencontré que deux individus." (MNHP).

Material. Syntype: 1♀ (Fig. 1), 'Sesia | sirphiformis, Luc.', '1544', 'Museum Paris', 'Holotypus | *Sesia* | *sirphiformis* Lucas | 1849 | K. Špatenka rev. 1991'. – **Italy, Sardinia**: 17♂, 21♀, Caglari, Villaputzu, Porto Corallo, larva/pupa reared from *Lotus creticus*, 21.v./v–vi.2004; 17♂, same data, pheromone; 11♂, 34♀, Caglari, Muravera, Stagno di Saline, larva/pupa reared from *Lotus creticus*, 26.v./v–vi.2004; 8♂, 5♀, same data, by net; 6♂, 2♀, Oristano, San Giovanni di Sinis, vic. Tharros, larva reared from *Lotus creticus*, 24.v./v–vi.2004; 5♂, Oristano, Stagno s'Ena Arrubia, 24.v.2004, pheromone; 1♂, Ogliastra, Bari Sardo, 18.vi.2009; 1♀, Nuoro, 5 km S Orosei, larva reared from *Lotus creticus*, 17.v./30.vi.2004; 28♂, 10♀, Ogliastra, vic. Arzana, larva reared from *Psoralea bituminosa*, 21.vi./vii–viii.2005; 78♂, same data, pheromone. **Italy, Sicily**: 3♂, 8♀, Madonie, vic. Polizzi Generosa, larva reared from *Psoralea bituminosa*, 15.v./vi–vii.2007; 3♂, 3♀, vic. Lercara, larva/pupa reared from *Hedysarum coronarium*, 16.v./v–vi.2007. **Morocco**: 5♂, 4♀, Middle Atlas Mts, Jbel bou Iblane, vic. Tafferte, larva reared from *Ononis spinosa*, 10.v./vi–vii.2006; 9♂, 2♀, same locality, 5.viii.1997; 7♂, 5♀, 10 km W Tiznit, larva reared from *Lotus creticus*, 18.v./vi–vii.2005; 2♂, same data, larva ii.2006; 1♂, 2♀, same data, larva v–vii.2005; 2♂, 10 km S Agadir, larva reared from *Lotus creticus*, vi.2005.

Dipsosphecia megillaeformis v. *tunetana* Le Cerf, 1920: 305 **syn. n.**, Lectotype ♀, des. Špatenka, 1992: 487 (Fig. 2): "Environs de Tunis, ex racines de Sulla, VI, coll. F. Le Cerf." (MNHP).

Material. 1♀ (Fig. 2) [lectotype of *Dipsosphecia megillaeformis* v. *tunetana* Le Cerf, 1920], 'Tunis | e.l. VI | Hedys. coron.' 'tératolog. | nerv 2 bifurq. | aile inf. dr.', '*Dips. sirphiformis* Luc. | v. tunetana Le Cerf | ♀ Type | Et. Lep. Cie. XVII | Coll. F. Le Cerf', '*Dipsosphecia* | *megillaeformis* | var. *tunetana* Le Cerf | Et. Lepid. comp., | XVII, 1920, p. 305', 'Lectotypus ♀ | *Dipsosphecia* | *megillaeformis* | v. *tunetana* Le Cerf, | 1920 | K. Špatenka des. 1991', 'Bembecia | tunetana ♀ | det. E. Bettag 1998' [genitalia dissected, fixed on paper card and figured by Bettag & Bläsius (1999)]. – 1♂ (Fig. 3) [paralectotype of *Dipsosphecia megillaeformis* v. *tunetana* Le Cerf, 1920], 'chenille dans | racines de Sulla | eclos V-1911 | envoi de Tunis', 'Dipsosphecis | ichneumoniformis F. | coll. F. Le Cerf ♂', 'Paralectotypus ♂ | *Dipsosphecia* | *megillaeformis* | v. *tunetana* Le Cerf | 1920 | K. Špatenka des. 1991', '*Bembecia* | *tunetana* Le Cerf | R. Bläsius det. 11/1998' (MNHP). – **Tunisia**: 5♂ (Figs 4, 13), 4♀ (Figs 5, 6, 17), vic. Beja, 1–31.vii.2000, ex larva reared from *Hedysarum coronarium*, leg. R. Bläsius (CRB, CDB).

In his original description, Lucas (1849) mentions two specimens of *Sesia sirphiformis*, only one of which is currently deposited in the collection of the MNHP. This is a syntype and not the holotype as mentioned by Špatenka (1992). The second syntype may have been destroyed or lost a long time ago (Le Cerf 1920), thus my decision is to



Figs 1–6. Adults of *Bembecia sirphiformis* (Lucas, 1849), scale bar: 10 mm. **1.** ♀ syntype [insert: Original figure in Lucas, 1849]. **2.** ♀ lectotype of *Dipsosphecia megillaeformis* v. *tunetana* Le Cerf, 1920. **3.** ♂ paralectotype (MNHP). **4–6.** Specimens from Tunisia, vic. Beja, larva reared from *Hedysarum coronarium*. **4.** Male. **5.** Female, dark form with reduced LTA and small ETA. **6.** Female, pale form with small LTA and large ETA.

refrain from a lectotype designation. The remaining syntype is in a bad condition. The head, abdomen, and legs apart from the right hindleg are missing; the wings are not

spread making the hindwings incompletely visible. A lack of a longitudinal transparent area confirms the female gender of the specimen, despite the missing antennae and abdomen. The illustration of *Sesia sirphiformis* in Lucas (1849) (Fig. 1, insert) shows the tergites of the abdomen marked with five relatively consistent yellow posterior annulations. Females of *B. astragali* have only tergite 2, 4, and 6 with such complete yellow annulations and that on tergite 3 is indistinct or absent. Furthermore, the syntype of *sirphiformis* differs clearly from female specimens of *B. astragali* by the absence of a longitudinal transparent area (LTA), which is always present in both genders of *B. astragali*, and by the narrow external transparent area (ETA), consisting of three well-developed cells and mostly an additional very indistinct narrow cell (ETA distinctly broader, consisting of four well-developed cells in *B. astragali*).

The type series of *Dipsosphecia megillaeformis* var. *tunetana* was reared from larvae, which were found in the roots of *Hedysarum coronarium* (Fabaceae) (Le Cerf 1920). Since then, specimens that can be identified as conspecific without doubt have been collected only once. A series of five males and four females was reared by Bläsius from larvae found on *H. coronarium* in the vicinity of Beja, Tunisia. The females exhibit some variation in size and colouration, in the intensity of the forewing discal spot and in the extension of the transparent areas. The LTA is mostly absent, but sometimes very small, the ETA consists of 2, 3, or 4 partially very small cells (Figs 1, 2, 5, 6). The type localities of both *B. sirphiformis* and *D. megillaeformis* var. *tunetana* are separated by only about 200 km, and Beja is located almost in the middle. No other related species are known from this area. For the above reasons, *D. megillaeformis* var. *tunetana* is considered a synonym of *B. sirphiformis*.

B. sirphiformis appears to belong to the *B. ichneumoniformis* (Denis & Schiffermüller, 1775) species group and is closely related and habitually almost indistinguishable from *B. albanensis* (Rebel, 1918) from Southern and Central Europe, *B. handiensis* Rämisch, 1997 from Fuerteventura and Morocco, and *B. psoraleae* Bartsch & Bettag, 1997 from the Iberian Peninsula, southern France, and northwestern Italy. The males of *B. albanensis* have the yellow annulations less brilliant and more greyish. Small differences exist in the morphology of the genitalia. Male genitalia (Fig. 13) differ by the shape of the crista sacculi of the valva. In *B. sirphiformis* it has a short bald, apically directed ridge distally, which is lacking in *B. albanensis* (Fig. 14). The saccus is shorter and broader in *B. sirphiformis*. Furthermore, *B. sirphiformis* differs from *B. albanensis* and *B. handiensis* by the size of the medial crista of the gnathos, which is less prominent in *B. albanensis* and much bigger in *B. handiensis*. The females (Fig. 17) differ in the shape of the ostium bursae, which is y-shaped in *B. sirphiformis*, v-shaped in *B. psoraleae*, and with semi-circled lateral hemispheres in *B. albanensis* (Fig. 18), as well as the surface structure of the ante vaginal plate (densely grained, without folds in *B. sirphiformis* (Fig. 17, detail) and *B. albanensis* (Fig. 18, detail); scarcely grained, with strong folds in *B. psoraleae*). *B. psoraleae* differs further by a small sclerotised signum of the corpus bursae.

Bembecia sirphiformis (as *B. tunetana*) has been reported from northern Africa, Sicily, Sardinia, Corsica, and southern Italy (Bertaccini & Fiumi 2002; Laštůvka & Laštůvka 2001; Špatenka et al 1999). The European populations and specimens from

Morocco, reported by Bettag & Bläsius (1999), however, differ significantly in occurrence time and host-plant preference and have conspicuously different barcode sequences (Pühringer, in litt.). Therefore, the records of *B. sirphiformis* from Europe and Morocco are doubtful and may belong to other species. The relationships of the species in this complex and their distributions remain unclear and need further investigation.

Bembecia astragali (Joannis, 1909) stat. rev. Figs 7–12, 15, 16, 19, 20

Sesia astragali Joannis, 1909: 183. Lectotype ♀, des. Špatenka, 1992: 487 (Fig. 8): "Sur les collines entourant l'etang de la Bonde (par la Motte d'Aigues, Vaucluse)" (MNHP). 'Cotype | exemplar dessiné | *Astragalus*, la Bonde (Vaucluse), 21.vii.08 | astragali | 1920–1932 coll. L. & J. de Joannis, Muséum Paris' (Špatenka 1992).

Material. Paralectotype: 1♀ (Fig. 8), 'Astragalus | la Bonde (Vaucluse) | 21 VII 08', 'P.E.L. Viette det. 19 | Sesia | astragali | Joannis', 'Paralectotypus ♀ | Sesia astragali | Joannis, 1909 | K. Špatenka des. 1991' (MNHP). – Southern **France**, Provence: 7♂, 3♀, Dpt. Vaucluse, Rustrel, larva reared from *Astragalus monspessulanum*, 4.vi./vii.1992 (1♂, 1♀, Figs 9, 10; genitalia Figs 15, 20, two other specimens with the same data); 1♂, 1♀, same data, 27.vi./vii.1993; 7♂, 4♀, same data, 2.iv./vii–viii.1999; 1♂, same data, 27.vi./10.vii.2006; 1♂, 1♀, same locality; pupa reared from *Colutea arborescens*, 4.viii./viii.1993; 4♂, same locality, 5.viii.1993, pheromone; 2♂, Dpt. Drome, Montbrun les Bains, 28–30.vi.2006, pheromone; 2♂, Dpt. Drome, Col Aulan, 27.vi.2006, pheromone; 3♂, same data, 5.viii.1993; 3♂, same data, 25.vii.1992; 1♂, Dpt. Drome, Buis, Plaisians, 26.vii.1992, pheromone; 1♂, Dpt. Drome, Caseneuve, 3.viii.1993, pheromone; 1♂, Dpt. Vaucluse, Luberon, Cereste, 1.viii.1993, pheromone; 1♂, Dpt. Haut Alpes, Serres, Savournon, larva reared from *Astragalus monspessulanum*, 21.vi./vii.2010. **Spain**, Andalusia, Serrania de Ronda: 25♂, vic. Ronda, 24–28.vi.1993, pheromone; 6♂, Atajate, 24.vi.1994, pheromone; 8♂, Cortes de la Frontera, 19.vii.2004, pheromone; 3♂, el Burgo, 17–21.vii.2004, pheromone. **Italy**, Piemonte: 10♂, 13♀, Arquata Scrivia, Sottovale, ex larva reared from *Astragalus monspessulanum*, 30.v./vii–viii.2010. **Morocco**, High Atlas: 31♂, Tizi-n-Tichka, 10–11.vi.1996, pheromone; 8♂, Imilchil, Tizi-n-Tirhadouine, 26.vi.2008, pheromone; 4♂, Marrakech, Telouet, 26.vi.2008, pheromone; 1♂, Marrakech, Tizi-n-Fedrhat, 27.vi.2008, pheromone; 14♂, Ait Bou Guemez, Jbel M'Goun, 28.vi.2008, pheromone; 3♂, Tizi-n-Ouano, 2.vii.2008, pheromone; 1♂, 1♀ (Figs 11, 12), Iguer, larva reared from *Colutea atlantica*. Middle Atlas: 1♂, Jbel bou Iblane, 6.vii.2008, pheromone; Tizi-n-Ifar, 2♂ 6.vi.1999, 2♂ 16.vi.2007, pheromone; 1♀, same locality, larva reared from *Astragalus* sp.; 1♀, same locality, larva reared from *Colutea atlantica*. **Slovenia**: 1♂, vic. Koper, 20.vi.–23.vii.2003; 3♀, same locality, larva reared from *Genista tinctoria*, vii.2004. **Croatia**: 1♂, Krk, 10.vii.1996, pheromone. **Greece**: Pindos Mts: 6♂, Kastanea, 5.viii.2002, pheromone; 1♀, same data, ovipositing at *Astragalus glycyphyllos*; 4♂, Kranea, 6.viii.2002; 2♂, Timphristos, Fourna, 14.vii.2008, pheromone. 4♂, Timfi Mts, Vrissohori, Aoosbridge, 4.viii.2002, pheromone. Mitsikeli Mts: 11♀, Kopuai, larva reared from *Colutea arborescens*, 27.v./vii.1995; 2♀, Karyes, 31.v./vii.1995; 3♀, vic. Konitza, larva reared from *Colutea arborescens*, 3.vi./vii.1997.

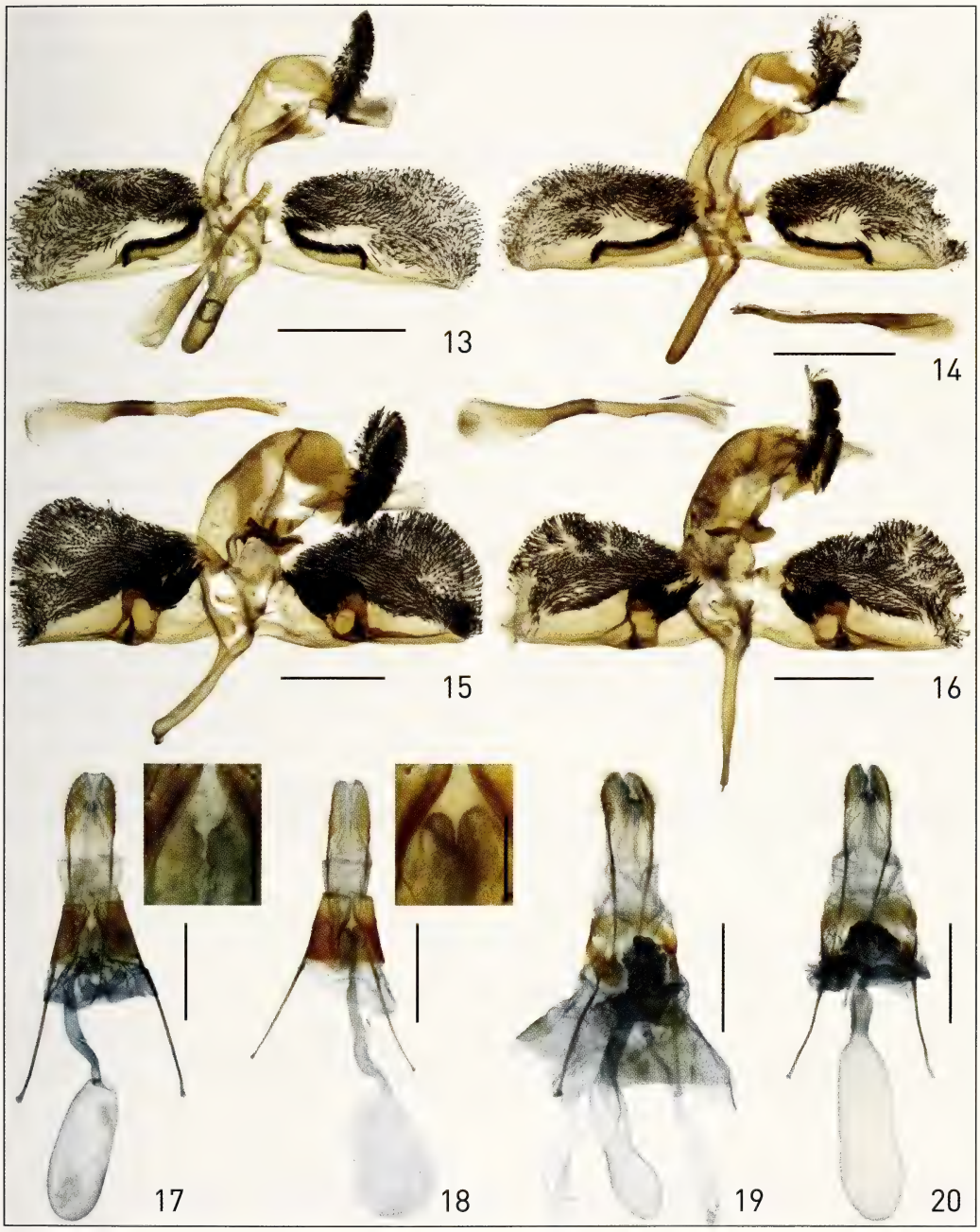
Bembecia igueri Bettag & Bläsius, 1998: 71 **syn. n.**
= *Bembecia sirphiformis* sensu auctorum (nec. Lucas, 1849).

Material. 1♂ (Figs 7, 16), **Morocco** 'Morocco / H. Atlas | Tizi-n-Test. 2100 m | 15.08.1997 | leg E. Bettag', 'Holotypus | Bembecia igueri | Bettag / Bläsius 1998', 'Nat. Hist. Museum | Mainz | E-2011/0425' (NHMM). – 1♂, same data, 'Paratypus, Bembecia igueri Bettag / Bläsius 1998', 'Nat. Hist. Museum Mainz E-2011/0426' (genitalia Fig. 16) [dissected by Bettag] (NHMM).

Bembecia astragali was described from a series of three males and six females. All specimens except one female were reared from larvae that were found in southern France, la Bonde, Vaucluse, in rootstocks of *Astragalus monspessulanum* (Fabaceae). One female was collected at Montserrat, Barcelona (Joannis 1909). Only one of the female paralectotypes from la Bonde was actually found in MNHP (Fig. 8). *B. astragali* (as *B. sirphiformis*) is a well-known member of the *B. megillaeformis* (Hübner,

Figs 7–12. Adults of *Bembecia astragali* (Joannis, 1909). **7.** ♂ holotype of *Bembecia igueri* Bettag & Bläsius, 1998 (NHMM). **8.** ♀ paralectotype (without scale bar) (MNHP). **9–10.** Male and female, France, Vaucluse, Rustrel, larva reared from *Astragalus monspessulanum*. **11–12.** Male and female, Morocco, High Atlas, Iguer, larva reared from *Colutea atlantica*.

1813) species group (Bertaccini & Fiumi 2002; Freina 1997; Laštůvka & Laštůvka 1995, 2001; Špatenka et al. 1999). The genitalia, especially that of the males, are very



Figs 13–20. Genitalia structure of *Bembecia* species, scale bar: 1 mm; inserts (ostium details) scale bar: 0.2 mm. **13.** *B. sirphiformis* ♂, Tunisia, vic. Beja. **14.** *B. albanensis* ♂, Parnass Mts, Greece. **15.** *B. astragali* ♂, France, Rustrel. **16.** *B. astragali* ♂, Morocco, Tizi-n-Test (paratype of *B. igueri*, NHMM). **17.** *B. sirphiformis* ♀, Tunisia, vic. Beja. **18.** *B. albanensis* ♀, Markgröningen, Germany. **19.** *B. astragali* ♀, Morocco, Tizi-n-Test. **20.** *B. astragali* ♀ France, Rustrel.

homogeneous within this group and scarcely suitable for determination (Laštůvka & Laštůvka 2001). Larger specimens of *B. astragali* are very typical and unmistakable,

whereas small specimens can be confused with *B. iberica* Špatenka, 1992, which, however, has a very different morphology of the genitalia. The Moroccan *B. igueri* Bettag & Bläsius, 1998 syn. n. is here considered conspecific with *B. astragali*. It was described from a series of six males that were captured with the help of synthetic sexual pheromones at the Tizi-n-Test, in the western part of the High Atlas Mountains. A male and a female specimen from the type locality were reared by the author from larvae, which were found in rootstocks of *Colutea atlantica* (Fabaceae) (Figs 11, 12). This male and the specimens of the type series agree perfectly. They differ only marginally from typical French specimens of *B. astragali*, which were reared from *Colutea arborescens* and *Astragalus monspessulanum*. Males of *B. astragali* are strongly attracted by various synthetic pheromones and have been collected in large numbers. The males from Morocco show greater individual variation than specimens from Europe. The ground colour of the forewing, including the apical area, varies from nearly completely black to orange-yellow, and the discal spot is sometimes completely orange-yellow. The ETA can consist of four or five cells and its width is very variable, with occasionally only a very small apical area. The population of the Tizi-n-Test is in the southwestern extreme of the known range. Its representatives are generally somewhat darker with slightly smaller transparent areas and somewhat more prominent discal spots. Differences mentioned in the original description of *B. igueri* cannot be confirmed: "Arten der *Bembecia sirphiformis*-Gruppe [auctorum] unterscheiden sich am auffälligsten von der neuen Art und von *Bembecia megillaeformis* durch die kurze Stielung der Adern M_3-Cu_1 und durch lange Haarschuppen an den Vordercoxen [...]" (Bettag & Bläsius 1998). Investigation of several specimens of *B. megillaeformis* and *B. astragali* shows that the common stalk of veins M_3-CuA_1 varies much more in length as noted, broadly overlapping for both species. The long, hair-like scales of the forecoxa are common to all freshly emerged male specimens of *Bembecia*.

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Thomas Sobczyk 2011. Psychidae (Lepidoptera). – *In*: M. Nuss (ed.), World Catalogue of Insects, Volume 10, Apollo Books Aps., Stenstrup, Denmark, 467 pp. Hard cover, Price EUR 138 (USA $192), excluding postage.

It has been more than 80 years since the last global catalogue of the bagworm family Psychidae by Dalla Torre and Strand (1929) was published. As is carefully documented in the abstract section of this latest catalogue by German Lepidopterist, Thomas Sobczyk, many new taxonomic changes have occurred over the ensuing years, and our knowledge of this biologically interesting family has increased significantly. A total of 236 genera and 110 generic synonyms and unjustified emendations are listed, including 1,324 species names, 45 subspecies, and 391 species synonyms. These totals do not include the five genera and 26 species treated by Davis (2003) in the formerly considered family Arrhenophanidae, now regarded as a subfamily of Psychidae (Mutanen et al. 2010). Sobczyk does refer to this reference in the introduction of his catalogue and briefly refers to the most recent classification of Arrhenophaninae. These numbers were later added to the taxon totals for the Psychidae in van Nieukerken et al. (2011), bringing the current world totals to 241 genera and 1,350 species. Also summarised in the abstract of the catalogue are many new nomenclatural changes initiated by the author, including the introduction of three new generic names, two new generic synonyms, eight new species synonyms, a new replacement of a species name, and 144 new combinations. The type designations of four species are also presented.

In the introduction following the abstract, Sobczyk briefly reviews major features of the biology, classification, distribution, fossil records, and publication history of the family. The catalogue proper begins with references to all family group names in alphabetical sequence by subfamily. The genus and species names are not associated with subfamilies and, consequently, are likewise arranged alphabetically. In addition to the original literature reference, information about the type locality and type specimen(s) is provided for each species name. Any pertinent additional information is included under remarks. Following the procedure used in most recent Lepidoptera catalogues, gender agreement between the specific and generic names as prescribed by article 31.2 of the International Code of Nomenclature (ICZN 1999) is not adhered to (Sommerer 2002).

Concluding the catalogue are five sections listing names whose statuses remain uncertain, often because no specimens are known to exist, or what material remains is poorly preserved, found to be misplaced to family, are nomina nuda, or unrecognized for other reasons. These groups include 1) unplaced taxa, 2) unavailable names, 3) hybrids, 4) taxa excluded from Psychidae, and 5) one "unsolved" name.

Because of the abundance of taxon names in any large catalogue, the possibility for some misspellings always exists. Although most names were not checked, one misspelling was noted: the generic name *Acoremata* was misspelled "*Acomerata*" on page 42. Also, the genera *Apoecis* and *Aprata* (pp. 61–62) occurred out of sequence in the text and should have been listed alphabetically before *Apterona* (p. 58).

This catalogue will be a vital, necessary reference for all entomologists seeking up to date information on this biologically interesting and often economically important family. By providing an outstanding guide to the literature and taxonomic diversity of Psychidae, the author has facilitated the study of these insects appreciably.

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Bucculatrix ainsliella Murtfeldt, a new North American invader already widespread on northern red oaks (*Quercus rubra*) in Western Europe (Bucculatricidae)

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Abstract. *Bucculatrix ainsliella* Murtfeldt, 1905 is for the first time reported from Europe: the Netherlands, Belgium, and adjacent Germany. DNA barcodes confirm its identity. It is the first North American lepidopteran species feeding on northern red oak *Quercus rubra* ever found in Europe, and only the second North American oak-feeding insect found in Europe. The species has regularly been found in the Netherlands and northern Belgium since 2006, and in 2011 also in Nordrhein-Westfalen in Germany, adjacent to the Dutch border, but the earliest records are from the Netherlands, Amersfoort in 1989 and 1990. Early stages, leafmines, and the adult are described, illustrated, and diagnosed against oak-feeding *Bucculatrix ulmella* Zeller, 1848 and other similar species. The biology and distribution are discussed. This species can be abundant in Europe, but significant damage has not been observed.

Zusammenfassung. *Bucculatrix ainsliella* Murtfeldt, 1905 wird hier zum ersten Mal aus Europa gemeldet. DNA Barcodes bestätigen die Identität. Die bisherigen Fundorte liegen in den Niederlanden, Belgien und im angrenzenden Deutschland. Die in Nordamerika häufige Art lebt an Eichen (*Quercus* spp.), darunter auch an Roteichen (*Quercus rubra*). Nachdem bereits eine Blattlaus den Sprung über den Ozean geschafft hat, ist *B. ainsliella* nun die zweite Insektenart, die jetzt in Europa an den bereits im 17. Jahrhundert eingeführten Roteichen vorkommt. Die ersten Nachweise stammen von Amersfoort in den Niederlanden und wurden 1989–1990 gemacht. In Belgien taucht die Art 2006 auf, und in Nordrhein-Westfalen wird sie 2011 erstmals gefunden. Die Art ist mittlerweile in den Niederlanden und Belgien weit verbreitet und häufig, jedoch ohne Schäden anzurichten. Die Beschreibung und Abbildungen von Larvenstadien, Puppen und Blattminen werden vorgelegt und mit denen von *B. ulmella* Zeller, 1848 verglichen, die ebenfalls an Eiche lebt. Biologie und Verbreitung der Art werden ausführlich diskutiert.

Introduction

Northern red oak (*Quercus rubra* L.) was introduced into Western Europe at the end of the 17th century and became an economically important and widely planted timber tree in Central and Western Europe during the 19th and 20th century (Bauer 1953; Göhre & Wagenknecht 1955; Goßner et al. 2009; Magni Diaz 2004). Many authors noted that the number of insect species feeding on red oak in Europe is still very small and consists mainly of relatively polyphagous species (Csóka & Szabóky 2005; Goßner & Bräu

2004; Turčáni et al. 2009). This is in sharp contrast to the very rich entomofauna on the indigenous European deciduous oaks (in Northern and Western Europe mainly *Q. robur* L. and *Q. petraea* (Matt.) Liebl.), on which hundreds of herbivore species are known to feed (for Britain 423 species are cited: Kennedy & Southwood 1984; for Germany 699: Brändle & Brandl 2001). The difference can probably be explained by the phylogeny of the genus *Quercus*: the red oak belongs to a phylogenetically separate part of the genus *Quercus*, the section Lobatae (commonly known as "red oaks"), only known from the New World, whereas all European deciduous oaks belong to the so called "white oaks" (*Quercus* sensu stricto) that include both North American, European, and Asian species (Manos et al. 1999). Both groups of oaks harbour different faunas in North America (e.g,. Robinson et al. 2002), and in other studies it was shown that introduced oaks belonging to the same taxonomic group as native oaks received a considerably higher number of herbivores than oak species from different taxonomic groups (e.g., Connor et al. 1980). In the late 20th century, the first, and hitherto only, North American insect attacking *Q. rubra* was recorded from Europe, the aphid *Myzocallis* (*Lineomyzocallis*) *walshii* Monell, 1879 (Hemiptera, Aphidoidea). It has since become invasive and problematic in city areas (Havelka & Stary 2007; Modic 2010; Osiadacz & Wieczorek 2006; Perez Hidalgo et al. 2009; Pons & Lumbierres 2010). As far as we know until now, no species of Lepidoptera restricted to red oaks have been found in Europe. We here report first records of the oak skeletoniser *Bucculatrix ainsliella* Murtfeldt, 1905 from the Netherlands, Belgium, and Germany.

One of us (KJH) collected *Bucculatrix* specimens in a light trap in his garden in Wezep (Netherlands, province Gelderland) that he did not recognise and thus presented to JCK for dissection and identification. Because he also could not recognise these specimens as belonging to any species known from the Netherlands, photographs of the male genitalia were sent to WM, who identified it as the North American species *Bucculatrix ainsliella* in 2011. After that, we started looking for early life stages. From the life history in its original distribution area, we knew we had to look for a species likely feeding on *Q. rubra*, the only red oak that is commonly planted in the Netherlands. The search started in Wezep, near KJH's house, where *Q. rubra* is common. We found larvae and cocoons at two sites. After confirming the identity by breeding adult moths from the larvae and cocoons, these findings prompted a press release on 13 July 2011 (http://www.naturalis.nl/nl/over-ons/pers/persberichten/2011/eerste-vestiging-amerikaanse-eikenmot-europa) and a short online story in Dutch on a website for Microlepidoptera (van Nieukerken & Doorenweerd 2011).

Very soon after this media coverage, it became apparent that various records of this species were already available as misidentified or unidentified records on national observers' websites (http://waarneming.nl/contact.php; http://waarnemingen.be/index.php), and several collectors, including some of us, were able to record the species from more localities after knowing where and what to look for. Finally, searching collection holdings resulted in recognising several older specimens, including some from 1989 and 1990.

Bucculatricidae is a rather small family with 297 described species (van Nieukerken et al. 2011), most belonging to the very uniform genus *Bucculatrix* Zeller, 1839. In

Europe, 55 species are known (Mey 2010), in North America more than 100 (Braun 1963; Opler 1974; Rubinoff & Osborne 1997), the majority feeding on Asteraceae. Whereas there is only a single native *Bucculatrix* species feeding on oaks in Europe (*B. ulmella* Zeller, 1848, a confusing name, since it does not feed on *Ulmus*), there are at least 11 species associated with oaks in North America, which usually only feed on a single *Quercus* species or a limited group of either white or red oaks (Braun 1963). Most *Bucculatrix* species mine in their first larval instar, and later feed externally on the parenchyma between veins, making small windows in the leaf. The ribbed cocoon is one of the best characters and apomorphies for the genus. There is no single work treating all European species, and only a few papers can be used for the identification of a subset (Bengtsson & Johansson 2011; Langmaid et al. 2007; Mey 1999; Seksjaeva 1993; Svensson 1971), but a survey of European species is in preparation (Z. Tokár, personal information). All North American species are treated by Braun (1963), except the few that were described later (Opler 1974; Rubinoff & Osborne 1997). Baryshnikova (2008) provided the first phylogenetic analysis of the genus.

Material and Methods

Material

Specimens were either taken as adults collected at light, using various methods, or as larvae or cocoons from *Quercus rubra* trees and shrubs. Later in the year, larvae and cocoons were also found on fallen leaves, and cocoons were observed on tree trunks. Rearing in small plastic containers proved easy for the summer generation, although many parasitoids emerged as well. The material is either deposited in the collections of the Naturalis Biodiversity Centre, Leiden, or in private collections. Many records were identified from photographs provided by the observers. All data on specimens and observations of *B. ainsliella* are given in Table 1, and for barcoded specimens (also of other species) data are uploaded to the BOLD project "Lepidoptera of the Netherlands – public [NLLA]" (http://www.barcodinglife.com), where also Genbank Accession numbers can be found.

Morphological methods

Genitalia were dissected in the usual way (van Nieukerken 1985; Robinson 1976), males were stained with phenosafranin and females with chlorazol black. Because the valvae in the male genitalia of these species cannot be spread, we folded them downwards, whereas the socii remain in their posterior position (following Svensson 1971). Photographs of moths, leafmines, genitalia slides, and wing slides were taken with a Zeiss AxioCam digital camera attached, respectively, to a Zeiss Stemi SV11 stereomicroscope, a motorised Zeiss SteREO Discovery.V12 or a Zeiss Axioskop H, using Carl Zeiss AxioVision software. In the field, various digital cameras were used. Measurements of genitalia and mines were taken from photographs with AxioVision software, and measurements of moths were taken with the stereomicroscope provided

with a calibrated eyepiece graticule. The distribution map was prepared with the program "Klasse" (Anonymous 2011).

DNA barcoding

DNA was extracted destructively from larvae preserved in 96% ethanol or adult legs. Extractions were carried out with the Qiagen DNeasy Blood and Tissue kit. A 658 bp fragment of the mitochondrial COI gene was amplified using as primers Lep-F and Lep-R (Hebert et al. 2004), often tailed with T7 promotor [TAATACGACTCACTATAGGG] and T3 [ATTAACCCTCACTAAAG]. Amplification was performed in volumes of 25 µl. The PCR cycle consisted of 3 min initial denaturation at 94°C, 15 sec denaturation at 94°C, 30 sec at 50°C, 40 sec extension at 72°C for 40 cycles. After completion of all cycles, there was a final extension at 72°C for 5 min. A negative control with no template was included for each series of amplifications. The amplified products were separated on a 1% agarose gel and visualized under UV following staining with ethidium bromide before clean-up and sequencing.

PCR clean-up and bi-directional sequencing was outsourced to MACROGEN Europe on an ABI 3730XL. The chromatograms were checked with Sequencher (Gene Codes Corporation) and the resulting sequences were aligned by eye with reference to amino acids in BIOEDIT 7.0.9.0 (Hall 2004). Neighbor-joining (NJ) trees based on DNA barcode sequences of all available specimens, supplemented with publicly available sequences of Bucculatricidae, were calculated with PAUP* 4.0b10 (Swofford 2003), using uncorrected P distance (Srivathsan & Meier 2012). Inter- and intraspecific distances between the COI barcodes were calculated with the species delimitation plug-in v1.04 by Brad Masters & Howard Ross for Geneious (Drummond et al. 2011).

Results

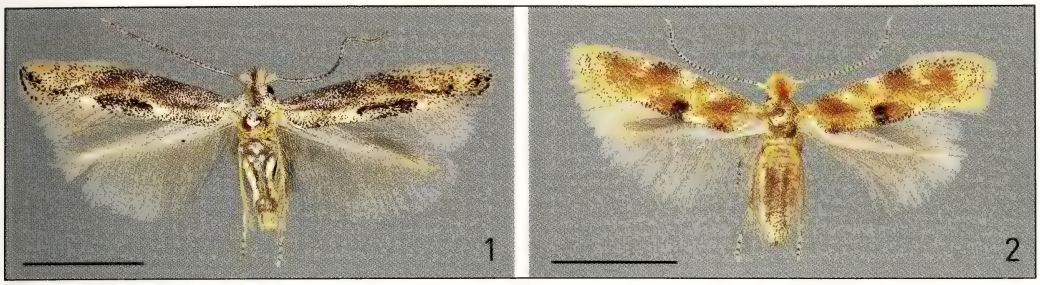
Bucculatrix ainsliella Murtfeldt Figs 1, 3–7, 13, 14, 17–19, 21–23, 26–30, 35

Bucculatrix ainsliella Murtfeldt 1905: 218. Holotype male: USA, Minnesota, Olmstead, cocoons, on/near black oak [*Quercus velutina*], C.N. Ainslie, Type 65035 (USNM). [not examined]

B. ainsliella; Gibbons & Butcher 1961: 681 [biology], Braun 1963: 167 [redescription, taxonomy], Gelok et al. 1999: 111 [recorded from British Columbia, phenology].

Material. See Table 1.

Diagnosis. Adults of *Bucculatrix ainsliella* can be distinguished from *B. ulmella*, the other European oak-feeding species, by the more monochrome grey forewing with the prominent elongate blackish brown spot on dorsum with white edging, the longer forewings and the distinct separation of dark and pale areas in the frontal tuft. Further, *B. ainsliella* is slightly larger. *B. ulmifoliae* (Hering, 1931) from *Ulmus* is also rather similar, has a rather similar frontal tuft, but the dorsal spot is more square and often much smaller, and the antennal annulation is regular. In living specimens, the spot in *B. ainsliella* is distinctly rounded and rendered more apparent by white edging. In European collections, *B. ainsliella* specimens were misidentified as *B. bechsteinella* (Scharfen-



Figs 1, 2. *Bucculatrix* species reared from *Quercus rubra*, Wezep, adult habitus. **1.** *B. ainsliella*, male, RMNH.INS.544410. **2.** *B. ulmella*, female, RMNH.INS.544416. Right antenna in Fig. 2 reconstructed from left antenna. Scales 2 mm.

berg, 1805), *B. demaryella* (Duponchel, 1840), and even *B. cidarella* (Zeller, 1839). These species have smaller dorsal spots than *B. ainsliella* and different antennal annulation. Photographs on observers' websites had been identified earlier as *B. ulmella*, *B. albedinella* (Zeller, 1839) or *B. noltei* Petry, 1912. Among other European *Bucculatrix* specimens, *B. ainsliella* usually stands out by its larger wingspan and elongate wings with the distinct spot. Annulation of antenna and legs also separate *B. ainsliella* and *ulmella* from various other Palaearctic species.

The male genitalia of *B. ainsliella* are large, bear a double row of cornuti in the bulbous basal part of the phallus, and the valva has a hooked apex. The male genitalia of *B. ulmella* are much simpler and smaller, and those of *B. ulmifoliae* can be recognised by the terminally hooked phallus and short socii (Fig. 16). Female genitalia are immediately recognisable by the extremely long ductus bursae, several times longer than the abdomen, presence of spines in ductus, and peculiarly shaped ostium and surrounding sclerotisations.

Description. Adult (male, female) (Figs 1, 3–7). Forewing length 3.7–4.0 mm (male), 3.4–3.9 mm (female), wingspan 7.6–8.8 mm (male), 7.6–8.4 mm (female). Head: frons white, irrorate with some pale grey scales, vertex with tuft of hairscales clearly separated in ferruginous central band and white lateral bands; neck tufts and collar white; labial palpus hardly visible, white. Antenna with 56–62 segments in both sexes; first flagellar segment strongly notched in male; scape dorsally white, irrorate with greyish brown scales, ventrally shining white with greenish reflections, flagellum dorsally greyish white, strongly annulated dark brownish grey, ventrally white, vaguely annulated; annulation regular until 23 segments before tip, after that with characteristic pattern as follows: segment formula (d=dark segment, w=white segment): 3d-1w-5d-1w-1d-1w-5d-1w-1d-4w (Fig. 7). Thorax and tegulae white, irrorate with greyish brown scales, thorax with two dark brown posterior spots. Legs: white on inner side; fore- and midfemur, -tibia and first segment of tarsus dark brownish grey with whitish irroration on outer side; hindfemur: whitish with pale grey irroration; tarsus segments 2–4 of all legs white with dark brownish grey apical rings, tarsus segment 5 white, apically tipped dark brownish grey, spurs dark greyish brown on outer side, white on inner side. Forewing white, heavily irrorate with ochreous-grey to dark grey scales,

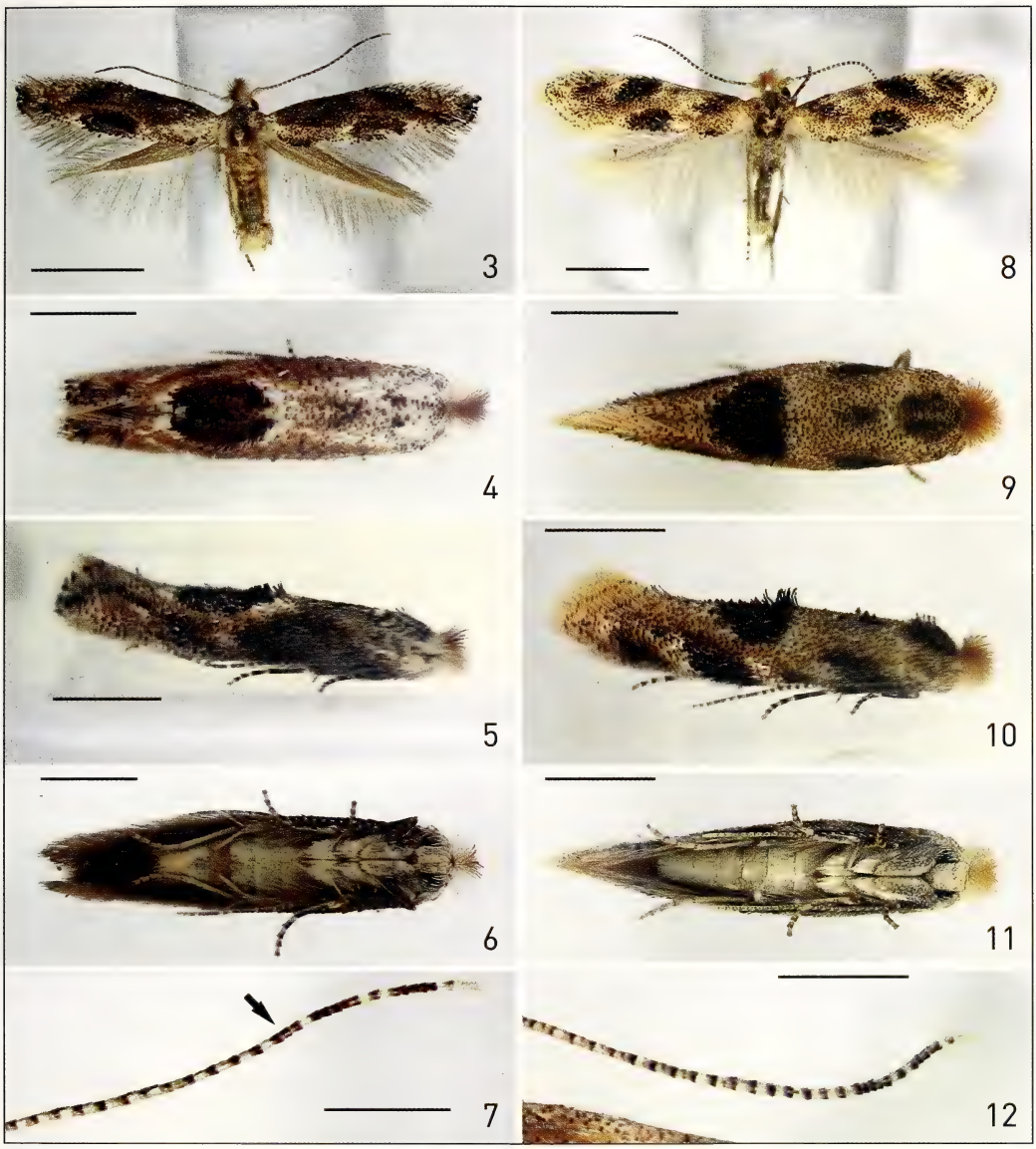
especially from fold to costa, a large blackish brown elongate spot on dorsum from just before 1/2 to 2/5, in- and outwardly edged whitish, a blackish brown inward oblique streak from costa at one-half to tornus, outwardly edged with white, tufts of raised blackish brown scales at dorsum near base, at inner edge of elongate spot and at dorsal end of inward oblique streak, two blackish brown cilia lines encircling apex, cilia pale grey. Hindwing shining grey, cilia pale grey. Underside: forewing shining dark grey, more ochreous towards apex, outer cilia line distinctly visible, hindwing shining grey. Abdomen dorsally shining grey, laterally shining pale grey, ventrally shining white, anal tuft white; abdomen in female widened posteriorly, covered with one broad anal tuft; in male tapering, anal tuft smaller, not completely covering external genitalia.

Male genitalia (Figs 13–14). In size almost twice as large as genitalia of *B. ulmella.* Socii long and slender, setose, narrowing apically, tip rounded. Vinculum more or less rounded, wider in the middle. Valva long (435–465 µm), broad at base, narrowing distally with narrowest part just beyond one-half, apex rounded and with a short and slightly bent latero-ventral hook. Phallus long (ca. 650–730 µm), bulbous at base, distal part tubular, one and a half times length of basal part, slightly narrowing distally and upwardly bent. Vesica with double row of eight long spiny cornuti.

Female genitalia (Figs 17–19). Anal papillae setose, posterior apophyses short, anterior apophyses absent. Tergite 8 with centrally elevated group of special scales. Ostium tubular, opening more or less triangular; connected laterally on sternum 8 to two semicircular excavations, broadly connected in the middle. Ductus bursae narrow and extremely long (almost 5 mm), coiled, ca. twice as long as abdomen, abruptly widening before entering corpus bursae and with anterior rows of spines, more or less along midline. Corpus bursae elongate, signa forming ring around posterior half, comprising rows of spined ribs, spines directed anteriorly.

Immature stages (Figs 21, 26–30). *Larva.* Early instar in mine yellow, with brown head capsule and prothoracic plate (Fig. 21). Free-living larva up to 5 mm long (Fig. 26), with pale yellowish green body; prothoracic and anal plates concolourous, head slightly more pale brownish. Pinacula not distinguishable, major setae appearing dark against light body. Rear end of the body tapering towards long anal prolegs (typical for the genus); the four abdominal prolegs relatively long. The free-living larvae are easily distinguished from those of *B. ulmella* by the absence of colouration. Larvae of *B. ulmella* are greyish green, with several indistinct darker longitudinal lines, and with about eight whitish spots on each body segment. *Pupa* (Figs 28–30). Only exuviae were studied (one on slide). Tenth abdominal segment (A10) with one pair of lateral tubercles, similar to most *Bucculatrix* species, but unlike *B. thoracella* (Thunberg, 1794) which has two pairs. Tergites A3–7 with 2–3 rows of rather coarse spines anteriorly, amidst a strong network of microspines (Figs 29, 30). Macroscopically, T2 seems also to have an indistinct row of spines, but this appears to be an indistinct row (or almost absent) when studied in a slide under high magnification (Fig. 29). *B. ulmella* has only single rows of large spines, none on T2, and the microspines are less strong (see also below).

Biology. Hostplants: *Quercus velutina* Lam. (eastern black oak) and *Q. rubra* L. (northern red oak). Single records on chestnut oak (*Quercus montana* Willd.) (Drooz



Figs 3–12. *Bucculatrix* species, comparison between oak feeding species in mounted and live specimens. **3–7.** *B. ainsliella*, female, Wezep, RMNH.INS.544411 (**3** and **7**), RMNH.INS.544412 (**4–6**). **8–12.** *B. ulmella*, male, 't Harde, RMNH.INS.544414 (**8–11**), female, as Fig. 2 (**12**). **7** and **12** show aberrant antennal annulation pattern, extra group of 3 dark segments in *B. ainsliella* arrowed. Some photos were mirrored for reasons of comparison. Scales 1 mm, 2 mm (**4**), 0.5 mm (**7** and **12**).

1960, cited by Gibbons & Butcher 1961), a white oak, and chestnut (*Castanea* sp.) (labels cited by Braun 1963) should be confirmed because of their different taxonomic placement. Since cocoons can be placed on any surface, records of cocoons alone are not sufficient proof for host records. In Europe only recorded from *Quercus rubra*.

Life history. The egg is deposited on the upperside of the leaf, adjacent to (but never on) a major vein. The empty eggshell is oval in outline, and has a cockled sur-

face, making it iridescent under magnification. The mine (Figs 21–23) is a full-depth gallery, more than 1 cm in total length (11–14 mm); except for the last few mm, the gallery is strongly contorted. The sides are not straight but rather scalloped or jagged. The larval exit is on the leaf underside. For most of its width, the gallery, larval chamber excluded, is filled with lumpy, brownish-black frass. The mining larva does not cross major veins. The mine itself is indistinguishable from that of *B. ulmella*, but consistently longer in the few measured mines.

The free-living larvae window or skeletonise the underside of the leaves by consuming the softer tissue between the minor veins. Skeletonised patches of several mm in diameter in northern red oak leaves are a good indication of the presence of *Bucculatrix*, but we are not sure how to discriminate between *B. ainsliella* and *ulmella*.

The larva makes two "moulting cocoons", usually in vein axils on a leaf underside and the final instar larva fashions an oval, ribbed cocoon, with 5–8 ribs, without a "picket fence" (or palisade, see Braun 1963). Most cocoons lie adjacent to a major vein, at the underside of the leaf, or at the leaf margin or the margin of a leaf hole. Unlike *B. ulmella*, which has a somewhat dirty yellow cocoon, the cocoon of *B. ainsliella* is bright white.

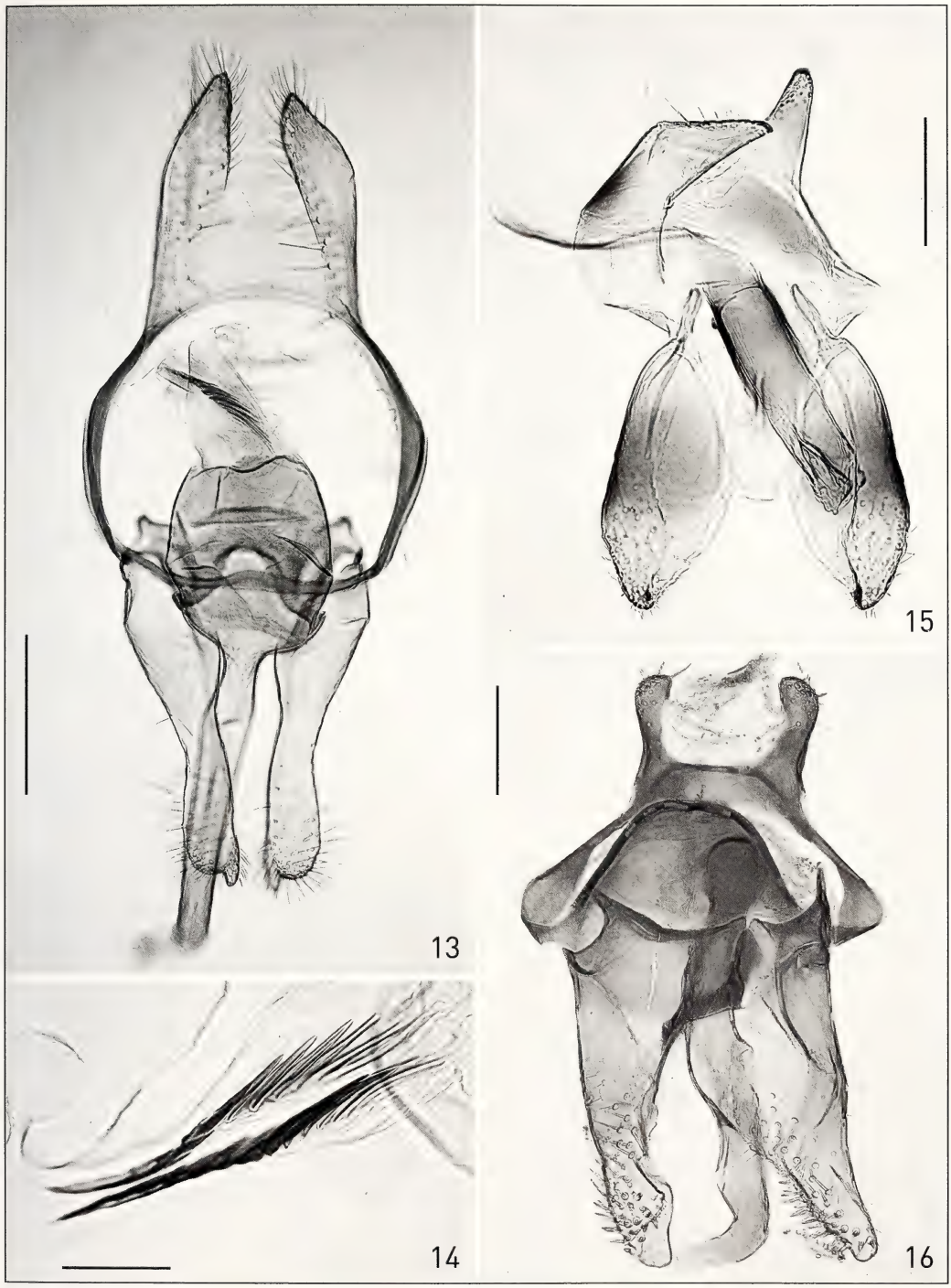
Voltinism. In North America recorded as bivoltine: larvae occur from mid April to early July and again from early August through mid-October. Cocoons of the first generation occur from late June to August, with moths flying from early July on, those of the second generation from October. Hibernation occurs in the pupal stage, on fallen leaves, trunks or other debris. Adults fly in spring mostly in April and early May, the summer generation from early July to August, in southern localities in the US until September (Braun 1963; Gelok et al. 1999; Gibbons & Butcher 1961). So far, the European records fit this general pattern (Table 1). Adults were found on the wing from mid-April to early October, thus a third generation might be a possibility.

Parasitoids. In the field, we very often observed cocoons with an exit hole of a parasitoid (see e.g., Ellis 2012, photo of cocoon), but until now, only a few hymenopterans have been reared from cocoons in Europe. They were all Ichneumonidae, two specimens belonging to the subfamily Campopleginae, and one to the genus *Gelis* Thunberg, 1827. The latter are often hyperparasitoids. In British Columbia and Canada the majority of parasitoids were also Ichneumonidae, but many Chalcidoidea were reared as well (Gelok et al. 1999).

From the native area of *B. ainsliella* the following parasitoids are recorded: Braconidae: *Pholetesor ornigis* (Weed, 1887), *Stiropius bucculatricis* (Ashmead, 1889); Eulophidae: *Chrysocharis* Forster, 1856 (unidentified species), *Cirrospilus cinctithorax* (Girault, 1916), *Cirrospilus flavicinctus* Riley, 1883, *Pnigalio maculipes* (Crawford, 1913); and Eurytomidae: *Eurytoma solenozopheriae* Ashmead, 1887 (Yu 2012).

Distribution (Fig. 35). Widespread in eastern North America, from the southern end of the Appalachians in South Carolina northward to the coastal area of New England, Nova Scotia, west to Oregon and Minnesota (Braun 1963), introduced into British Columbia in western Canada (Gelok et al. 1999).

Here, we record the species as new for Europe and currently found in The Netherlands, Belgium, and Germany. It is likely to be more widespread in Germany, and



Figs 13–16. *Bucculatrix* species, male genitalia. **13**, **14.** *B. ainsliella*, slides JCK7310 (= RMNH.INS. 544410), JCK3157. **15.** *B. ulmella*, JCK1898. **16.** *B. ulmifoliae*, slide JCK5549. Scales 200 µm (**13**), 100 µm (**15**, **16**), 50 µm (**14**).

should be searched for in France, Denmark, and other countries. Details of the records are presented in Table 1. The oldest specimens are from 1989–1990, and there is a gap in records between the 1989–1990 findings from Amersfoort and those in the Veluwe from 2003 onwards.

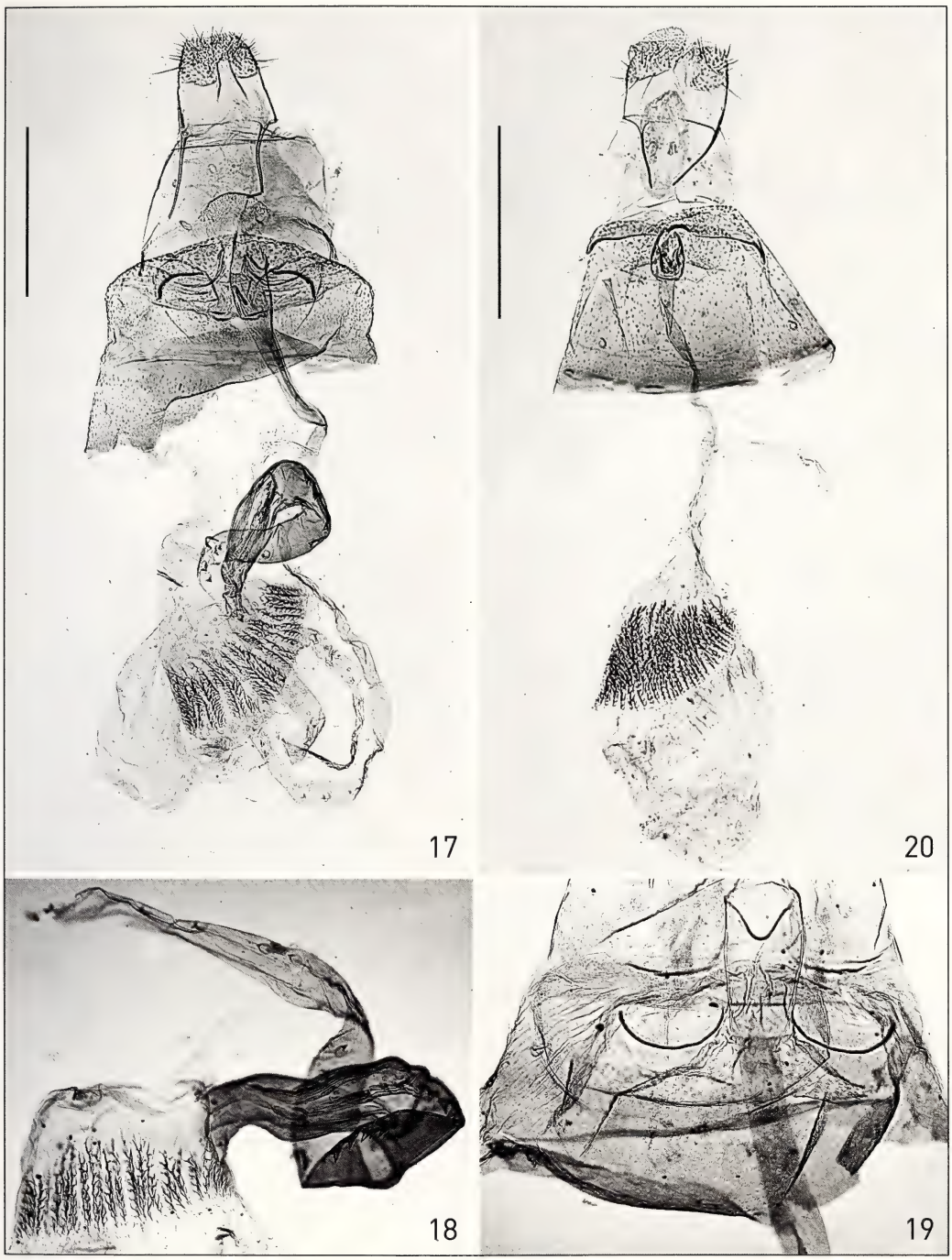
Damage. In North America, the species, known widely as the Oak Skeletonizer, can have outbreaks which lead to damage: trees that sustain repeated attacks are weakened and suffer crown thinning and die-back; ornamental trees appear especially vulnerable (Gibbons & Butcher 1961; Hanson & Walker 2004; Solomon et al. 2000). The prepupal larvae of *B. ainsliella* can be a nuisance when they are abundant because of their habit of descending along a silken thread (Gelok et al. 1999) and/or spinning cocoons over a variety of surfaces.

Remarks. The characteristic annulation of the antennae was also described by Braun (1963), but slightly different (probably an observation error). The pattern we see is constant in all specimens examined, and constantly different from *B. ulmella* that lacks the first group of three dark segments. The annulation pattern may be an interesting diagnostic character for the separation of *Bucculatrix* species. Braun described a comparable pattern for *B. pomifoliella* Clemens, 1860 and a slightly different one in *B. platyphylla* Braun, 1963; an illustration of European *B. demaryella* shows a similar pattern as well (Bengtsson & Johansson 2011).

Bucculatrix ulmella Zeller — Figs 2, 8–12, 15, 20, 24, 25, 31–34

Bucculatrix ulmella Zeller 1848: 289. Syntypes: [GERMANY, POLAND]: Berlin, Glogau [Glogow], "an Baumstämmen, besonders an Eichen" (types probably in London). [not examined]

Comparative notes. Adult (male, female) (Figs 2, 8–12) smaller than *B. ainsliella*: with forewing length ca. 3.1–3.4 mm, wingspan 6.7–7.6 mm. Antennal segments ca. 52–61, terminal segment formula: 5d-1w-1d-1w-5d-1w-1d-4w (Fig. 12), missing the first group of three dark segments present in *B. ainsliella*; first flagellar segment in male hardly notched. Head with tuft of scales completely ferruginous or yellow, only some pale scales may be seen laterally, but not banded as in *B. ainsliella*. Forewings with strong ochreous to ferruginous ground colour, black maculation variable, a squarish dorsal spot usually present. Male genitalia (Fig. 15) small. Socii short and triangular; valvae ca. 210–230 µm long, without apical hook. Phallus a short tube without cornuti. Female genitalia (Fig. 20) with short ostium, oval opening, no semicircular excavations. Ductus bursae slender, only slightly longer than corpus bursae, less than 1 mm long, without spines. Corpus bursae with signum comprising very closely set spined ribs, with very long spines, directed anteriorly.
Immature stages (Figs 24, 31–34). *Larva*. The free-living larva is basically greyish green, with several indistinct darker longitudinal lines, and with about eight whitish spots on each body segment. Larva in mine yellow (Fig. 24). *Pupa* (Figs 32–34). A10 with one pair of lateral tubercles. Tergites A3–7 with a single anterior row of rather coarse spines, in contrast to *B. ainsliella* that has 2–3 rows per seg-



Figs 17–20. *Bucculatrix* species, female genitalia. **17–19.** *B. ainsliella*, slides JCK7744 (**17**) and JCK 7734 (**18**, **19**). **20.** *B. ulmella*, JCK7732. Scales 500 µm.

ment. Microspines less conspicuous than in *B. ainsliella*. See also Patočka & Turčáni 2005.

Biology. Hostplants: *Quercus faginea* Lam., *Q. petraea* (Matt.) Liebl., *Q. pubescens* Willd., *Q. robur* L., *Q. rubra* L., *Q. trojana* Webb, and *Castanea sativa* Miller (Ellis 2012).
Life history: Very similar to *B. ainsliella*. Mines (Figs 24, 25) in principle inseparable, but smaller, with length of measured mines always less than 10 mm (ca. 8–9 mm), both on *Q. robur* and *Q. rubra*. Cocoon dirty yellow.

Distribution. Throughout Europe where oaks occur, yet to be recorded from Spain, Slovenia, Bosnia, Albania, and Bulgaria (Corley et al. 2006; Mey 2010).

Remark. The confusing name *B. ulmella* was suggested by Mann to Zeller (1848), who quoted Mann (in litt.) as describing that hundreds of caterpillars went down on threads from elms (*Ulmus*) near Vienna. Zeller also quoted Mann's description of the mine from *Ulmus*. Zeller identified the moths that he found on oak trunks as the same species, an understandable mistake, since the species that Mann described is probably *B. ulmifoliae*, a species externally rather similar to *B. ulmella*.

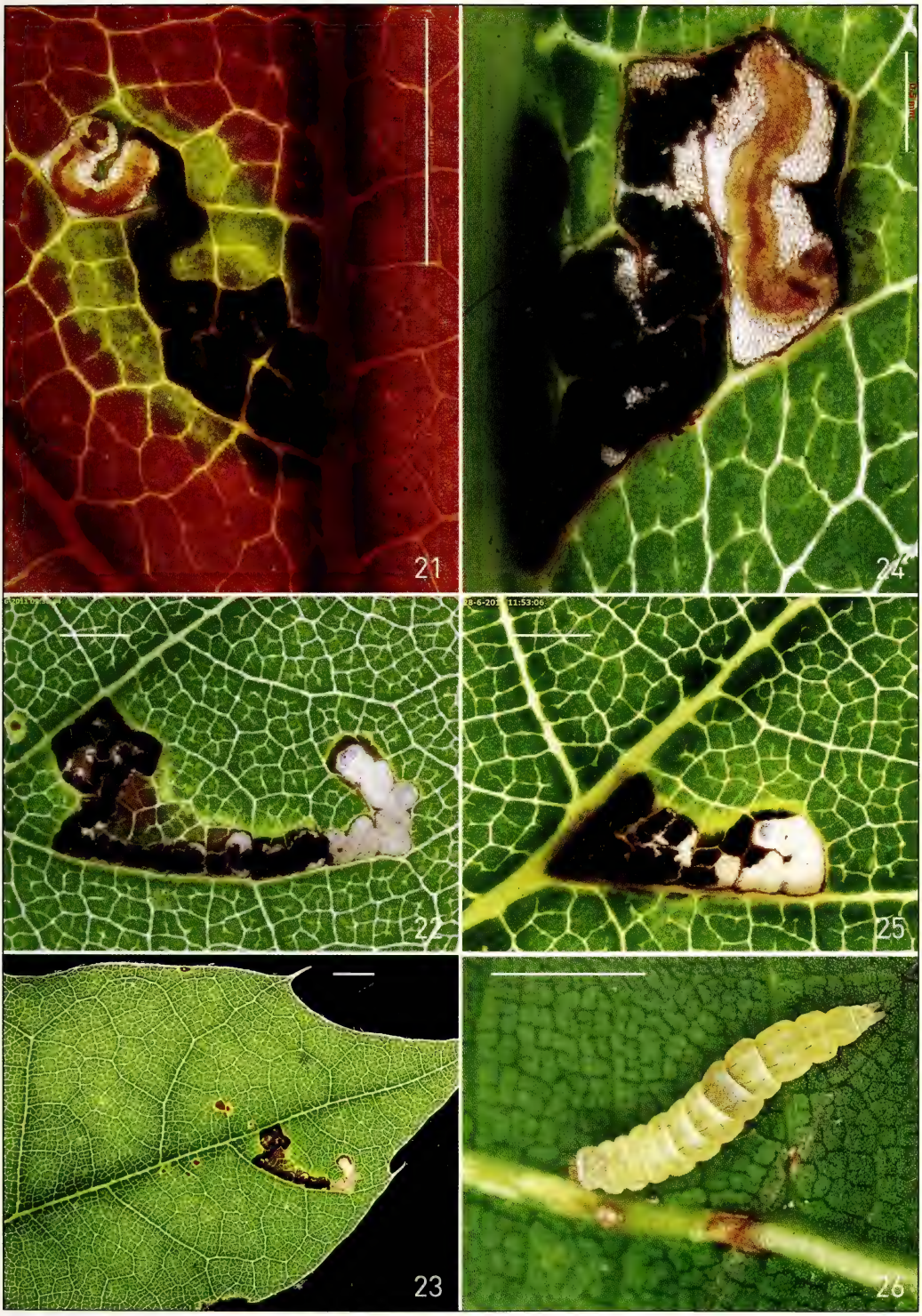
DNA barcodes

A neighbor-joining tree (Fig. 36) of DNA barcodes of our specimens of *B. ainsliella* combined with some other species from the Netherlands, plus publicly available barcodes of *Bucculatrix* (http://www.barcodinglife.com), demonstrate the conspecifity of Dutch and North American specimens. *B. ainsliella* is represented by 19 specimens, five from the Netherlands [NLLA] and 14 from North America, which collectively form a monophyletic cluster with an average (uncorrected) intraspecific distance of 0.7%. The Dutch specimens are represented by several haplotypes that are scattered over this cluster. The closest neighbour to *B. ainsliella* in this dataset of COI barcodes, which is lacking many species of *Bucculatrix*, is the North American *B. canadensisella* Chambers, 1875 at an average distance of 7.9%. This distance can be considered as relatively large for a distance to the nearest neighbour, when compared to other leafmining Lepidoptera (e.g., van Nieukerken et al. 2012a). The average intraspecific distances in *B. canadensisella* are 1.1%. *B. ulmella* is the nearest neighbour to *B. ainsliella* if the comparison is limited to European species, at an average distance of 8.0%. The average intraspecific distances in the available *B. ulmella* are 0.5%. This makes the identification of *B. ainsliella* by COI barcodes reliable.

Discussion

Lepidoptera on *Quercus rubra*

From the scarce literature data it appears that the northern red oak has a poor entomofauna in Europe, with few oak specialists. Polyphagous external feeding caterpillars, such as Tortricidae: *Archips xylosteana* (Linnaeus, 1758); Lasiocampidae: *Malacosoma*



Figs 21–26. *Bucculatrix* species, leafmines and larvae on *Quercus rubra*. **21–23**, **26.** *B. ainsliella*, Elmpt (21, RMNH.INS.18752), Wezep, Engelandseweg (**22**, **23**), Wezep, Patrijzenlaan (**26**). **24**, **25.** *B. ulmella*, Wezep, Wezeper Hei, (24 = RMNH.INS.18466). Scales 1 mm (**22**, **25**), 2 mm (**23**, **26**).

neustria (Linnaeus, 1758); Geometridae: *Operophtera brumata* (Linnaeus, 1758), *Erannis defoliaria* (Clerck, 1759), *Ectropis crepuscularia* (Denis & Schiffermüller, 1775), and *Colotois pennaria* (Linnaeus, 1761); Notodontidae: *Phalera bucephala* (Linnaeus, 1758) and *Thaumatopoea processionea* (Linnaeus, 1758); and Erebidae (Lymantriinae): *Lymantria dispar* (Linnaeus, 1758), *Calliteara pudibunda* (Linnaeus, 1758), *Euproctis chrysorrhoea* (Linnaeus, 1758), *E. similis* (Fuessly, 1775), and *Orgyia antiqua* (Linnaeus, 1758) have been recorded as defoliators on red oaks in Europe (Csóka & Szabóky 2005; Göhre & Wagenknecht 1955; Goßner & Hausmann 2009). Leafminers were rarely recorded, e.g., *Tischeria ekebladella* (Bjerkander, 1796) (Tischeriidae, Csóka & Szabóky 2005). While searching *Bucculatrix* mines in 2011, but also earlier, we have observed several more specialised oak-feeding leafminers on *Quercus rubra*, but usually in very low numbers, e.g., the Nepticulidae *Stigmella roborella* (Johansson, 1971), *S.* cf. *ruficapitella* (Haworth, 1828), *S. basiguttella* (Heinemann, 1862), *Ectoedemia albifasciella* (Heinemann, 1871), and the Gracillariidae *Caloptilia* sp., *Acrocercops brongniardella* (Fabricius, 1798), and *Phyllonorycter lautella* (Zeller, 1846). Only few of these were we able to rear, but since we did see completed mines, we think it most likely that all of the above can utilise this host. Apart from the lepidopteran leafminers, we also observed in June 2011 many old mines of the leaf-mining weevil *Orchestes quercus* (Linnaeus, 1758).

During our survey on the "Veluwe" near Wezep, we found larvae and cocoons of *Bucculatrix ulmella* (identity of mines proven by DNA barcodes) on *Q. rubra* at a locality where this species is common on indigenous *Quercus robur*, and where both trees grow intermingled. However, we have no evidence of the presence of *B. ulmella* on *Q. rubra* elsewhere. Further observations are needed to determine if both species occur syntopically more widely in Europe.

Quercus rubra has commonly been ignored by entomologists, because it is an exotic tree. This has, no doubt, contributed to the delayed detection of *B. ainsliella*, which has been present in Europe since at least 1989. Even though the general notion that *Q. rubra* has a poor entomofauna in Europe is definitely true and can be explained by the taxonomic separation between red and white oaks, it is also clear that there are gaps in our knowledge. Hopefully, with this new knowledge entomologists will also give attention to red oak trees so that a more complete record of insects associated with this species in Europe can be obtained.

Import of *Bucculatrix ainsliella*

The oldest known records from Europe originate from Amersfoort, province of Utrecht, the Netherlands. The (planted) forests in this area often consist entirely of *Quercus rubra*. An accidental introduction of *B. ainsliella*, therefore, could easily have been followed by establishment on its native hostplant. Close to Amersfoort is the former US Air Force Base Soesterberg, only closed in 2008. It is conceivable that moths or cocoons were transported by Air Force aircraft, or by military personal, living in this area. Cocoons of the hibernating generation, spun over virtually any surface in the vicinity of infested red oaks, including parked cars (Gelok et al. 1999), and which are present for more than six months in any year, are the likely source of the intro-

Figs 27–34. *Bucculatrix* species, cocoons and pupal exuviae of males. **27–30.** *B. ainsliella*, Wezep, Engelandseweg, RMNH.INS.544410. **31–34**. *B. ulmella*, 't Harde, RMNH.INS.544414. **29, 33.** Details of spines on T2 and 3. **30, 34.** Details of spines on T6 and 7.

duction. However, it may also be a sampling artefact that our first records are from near Amersfoort, and transport via containers on ships is another potential source of the original introduction. For another North American leaf-mining moth in Europe, *Macrosaccus robiniella* (Clemens, 1859) (as *Phyllonorycter robiniella*), it was suggested that either transport by air or by freight containers was the most likely source

Table 1. Specimens and observations of *Bucculatrix ainsliella* in Europe.

Stage, number	Registry #	Province	Locality	Date
2 cocoons, several mines		NL-DR	Boschoord	25-9-2011
3 adults ep, 4 mines, including 1 larva, 12 cocoons		NL-DR	Havelterberg	18-7-2011
cocoon with exuviae		NL-DR	Holtinge, Holtingerveld	21-7-2011
adult		NL-DR	Lhee, Dwingelderveld, Lheederzand	19-8-2011
cocoons and mines		NL-FR	Burgum	28-10-2011
cocoons and mines		NL-FR	Leeuwarden, Kleine Wielen	5-10-2011
cocoons and mines		NL-FR	Leeuwarden, Kleine Wielen	24-10-2011
cocoon on trunk of *Q. rubra*		NL-FR	Tytsjerk, Groot Vijversburg estate	24-10-2011
1 male, 2 females		NL-GE	Beekbergen, Engeland	1-8-2011
1 female		NL-GE	Beekbergen, Engeland	5-8-2011
1 adult		NL-GE	Beekbergen, Engeland	9-10-2011
1 female e.p., 4 cocoons,		NL-GE	Bennekom	19-7-2011
1 adult		NL-GE	Hoenderloo, De Rampe	18-9-2011
cocoons		NL-GE	Hoenderloo, Hoge Veluwe	30-10-2011
1 female		NL-GE	Twello	15-7-2003
1 male		NL-GE	Twello	18-7-2005
1 male		NL-GE	Twello	16-7-2007
1 male		NL-GE	Twello	21-8-2010
1 male		NL-GE	Twello	el 17-9-2009
1 male		NL-GE	Wezep	15-8-2009
1 male	RMNH.INS. JCK.7310	NL-GE	Wezep	29-4-2010
1 male	RMNH.INS. JCK.7513	NL-GE	Wezep	20-8-2010
1 male		NL-GE	Wezep	21-8-2010
1 male		NL-GE	Wezep	20-4-2011
1 male		NL-GE	Wezep	22-4-2011
cocoons		NL-GE	Zwolse Bos, Wezep-Heerde	18-7-2011
1 male	RMNH. INS.544410	NL-GE	Wezep, Engelandseweg	27-6-2011
1 female	RMNH. INS.544411	NL-GE	Wezep, Engelandseweg	27-6-2011
1 female	RMNH. INS.544412	NL-GE	Wezep, Patrijzenlaan	27-6-2011
> 250 cocoons, mines		NL-LI	Brunssumerheide, Heikop	15-8-2011
10 cocoons		NL-LI	Meinweg, Elfenmeer	16-8-2011
±150 mines, cocoons, several ♂ ♀ ep,		NL-LI	Meinweg, Vlodrop Station	31-7-2011

Abbreviations of countries and provinces: **BE** – Belgium: **AN** – Antwerpen, **LI** – Limburg, **OV** – Oost-Vlaanderen, **WV** – West-Vlaanderen. **DE** – Germany, Nordrhein-Westfalen. **NL** – Netherlands: **DR** – Drenthe, **FR** – Friesland, **GE** – Gelderland, **LI** – Limburg, **NB** – Noord-Brabant, **NH** – Noord-Holland, **OV** – Overijssel, **UT** – Utrecht.

Table 1. Table continued.

Leg	Method	Genitalia slide	Source	Longitude	Latitude
T. Muus			observation	52.90006	6.22525
T. Muus & S. Corver	ep	TM1159	coll. Muus	52.779	6.195
J. van Roosmalen			coll. Roosmalen. photograph *	52.811	6.248
J. Ebink	al		photograph *	52.823	6.412
G. Sinnema			photograph *	53.196	6.002
G. Sinnema			photograph *	53.217	5.886
G. Sinnema			photograph *	53.217	5.886
G. Sinnema			photograph *	53.215	5.907
L. Knijnsberg, J. van Roosmalen & A. Wijker	al		coll. Roosmalen. photograph *	52.158	5.95
L. Knijnsberg, J. van Roosmalen & A. Wijker	al		coll. Roosmalen. photograph *	52.158	5.95
J. van Roosmalen	al		coll. Roosmalen. photograph *	52.158	5.95
C. Geris	ep		coll. Muus *	52.011	5.681
L. Knijnsberg, A. Wijker	al		photograph *	52.121	5.911
W.N. Ellis			coll. Ellis	52.12	5.86
J. Wolschrijn		JCK7744	Coll Wolschrijn	52.2425	6.1084
J. Wolschrijn			Coll Wolschrijn	52.2425	6.1084
J. Wolschrijn			Coll Wolschrijn	52.2425	6.1084
J. Wolschrijn			Coll Wolschrijn	52.2425	6.1084
J. Wolschrijn	ep		Coll Wolschrijn	52.2425	6.1084
K.J. Huisman	al	JCK7310	RMNH	52.4544	5.9847
K.J. Huisman	al	JCK7513	Coll Huisman	52.4544	5.9847
K.J. Huisman	al	JCK7515	Coll Huisman	52.4544	5.9847
K.J. Huisman	al		RMNH	52.4544	5.9847
K.J. Huisman	al		Coll Huisman	52.4544	5.9847
K.J. Huisman	al		Coll Huisman	52.4544	5.9847
K.J. Huisman			observation	52.426	6.038
C. Doorenweerd & E.J. van Nieukerken	ep	JCK7310	RMNH	52.45017	5.98397
C. Doorenweerd & E.J. van Nieukerken	ep		RMNH	52.45017	5.98397
C. Doorenweerd & E.J. van Nieukerken	ep		RMNH	52.45529	5.98532
A. Schreurs	ep		coll Schreurs	50.928	6.006
A. Schreurs & M. van Stiphout			coll Schreurs	51.18	6.128
A. Scheurs & R. Seliger	ep		coll. Scheurs & Seliger	51.152	6.155

Method: al – at light, ep – reared from larva or cocoon.
* – details to be found at http://waarneming.nl/soort/view/211390
** – details to be found at http://waarnemingen.be/soort/view/211390

Table 1. Table continued.

Stage, number	Registry #	Province	Locality	Date
adults ep, cocoons		NL-LI	Meinweg, Vlodrop Station	2-7-2011
adult		NL-LI	Meinweg, Vlodrop Station	22-7-2009
1 female e.p., cocoon on *Cytisus scoparius*		NL-LI	Meinweg	ep 15-4-2007
leafmines		NL-LI	Meinweg, Roermond	4-9-2011
adult		NL-LI	Sint-Odiliënberg	9-9-2009
5 cocoons		NL-LI	Vijlenerbosch	13-8-2011
mines		NL-LI	Wellerlooi, De Hamert	1-8-2011
cocoons, e.p. 1 adult		NL-LI	Wellerlooi, De Hamert	2-8-2011
several mines and cocoons		NL-NB	Malpieven	17-7-2012
several adults		NL-NB	Nuenen	21-7-2010
several adults		NL-NB	Nuenen	11-7-2010
several adults		NL-NB	Nuenen	24-5-2011
several adults		NL-NB	Nuenen	27-6-2011
several mines and cocoons		NL-NB	Plateaux	18-7-2012
cocoon		NL-NH	Amstelveen, Gaasperplaspark	2011
1 male		NL-OV	Onna	20-7-2011
mines, 1 cocoon		NL-OV	Enschede, De Tip	24-7-2012
adult		NL-OV	Zwolle	19-4-2009
1 male		NL-UT	Amersfoort-Zuid	28-9-1989
1 male		NL-UT	Amersfoort-Zuid	30-4-1990
1 female		NL-UT	Amersfoort-Zuid	5-8-1990
1 male		NL-UT	Amersfoort-Zuid	15-8-1990
adults		NL-UT	Baarn, De Vuursche	7-5-2011
1 mine		NL-UT	Soest - Monnikenbos	19-7-2012
adult		BE-AN	Balen, Rosselaar	29-7-2010
adult		BE-AN	Berchem	12-5-2006
adult		BE-AN	Edegem	11-5-2011
cocoons		BE-AN	Meerhout	10-9-2011
adult		BE-AN	Mol, Molse zandputten	27-9-2011
adult		BE-AN	Mortsel	23-7-2010
adult		BE-LI	Lommel, Grote Barreel	3-10-2011
50 cocoons		BE-LI	Zutendaal	8-6-2011
10 cocoons, heavily parasited		BE-OV	Knesselare, Drongengoedbos	16-9-2011
adult		BE-WV	Torhout, Groenhove area	30-7-2011
Several mines and cocoons, 2 ep		DE	Rosenthal	31-7-2011
cocoons, vacated mines		DE	Elmpter Wald, near Dutch border	15-10-2011
cocoons, vacated mines, 1 larva		DE	Elmp, 2 km S, Dutch borderpole 938	16-10-2011

Abbreviations of countries and provinces: **BE** – Belgium: **AN** – Antwerpen, **LI** – Limburg, **OV** – Oost-Vlaanderen, **WV** – West-Vlaanderen. **DE** – Germany, Nordrhein-Westfalen. **NL** – Netherlands: **DR** – Drenthe, **FR** – Friesland, **GE** – Gelderland, **LI** – Limburg, **NB** – Noord-Brabant, **NH** – Noord-Holland, **OV** – Overijssel, **UT** – Utrecht.

Table 1. Table continued.

Leg	Method	Genitalia slide	Source	Longitude	Latitude
K.J. Huisman	ep		Coll Huisman	51.152	6.155
T. Muus	al		coll. Muus	51.152	6.155
W. Wittland		Tokár 607	coll. ÖZK	51.152	6.155
V. Middelman & R. Vos			photograph *	51.182	6.046
E. Clerx	al		photograph *	51.143	6.002
A. Schreurs				50.77	5.953
W.N. Ellis			coll. Ellis	51.518	6.172
W.N. Ellis			coll. Ellis	51.512	6.173
C. Doorenweerd, H. Dries & T. Muus			RMNH	52.18958	5.29524
C. Nolte	al		photograph *	51.47	5.551
C. Nolte	al		photograph *	51.47	5.551
C. Nolte	al		photograph *	51.48	5.56
C. Nolte	al		photograph *	51.48	5.56
C. Doorenweerd & C. Van Steenwinkel			RMNH	51.27108	5.40085
T. Hakbijl			RMNH	52.31	4.99
T. Muus			coll. Muus	52.775	6.149
J.C. & P.M. Koster			RMNH	52.257	6.969
G. Veurink	al		photograph	52.523	6.049
K.N. Nieuwland	al	JCK3157	RMNH	52.13881	5.38087
K.N. Nieuwland	al		RMNH	52.13881	5.38087
K.N. Nieuwland	al		RMNH	52.13881	5.38087
K.N. Nieuwland	al		RMNH	52.13881	5.38087
L. Knijnsberg, J. van Roosmalen & A. Wijker	al		coll. Roosmalen. photograph *	52.186	5.232
H. Soetekouw			photograph	52.15	5.335
Ludwig Jansen	light trap		photograph **	51.172	5.143
			photograph **	51.181	4.425
			photograph	51.153	4.438
C. van Steenwinkel			photograph **	51.108	5.053
C. van Steenwinkel	al		photograph **	51.215	5.112
			photograph	51.167	4.45
H. Dries.	al		photograph **	51.23	5.374
C. Snyers			coll. Snyers	50.933	5.577
S. Wullaert			coll. Wullaert	51.146	3.454
T. Vermeulen	light trap		photograph **	51.072	3.134
A. Scheurs & R. Seliger	ep		coll. Seliger	51.131	6.132
E.J. van Nieukerken			RMNH	51.2222	6.0749
E.J. van Nieukerken			RMNH	51.19332	6.16207

Method: al – at light, ep – reared from larva or cocoon.
* – details to be found at http://waarneming.nl/soort/view/211390
** – details to be found at http://waarnemingen.be/soort/view/211390

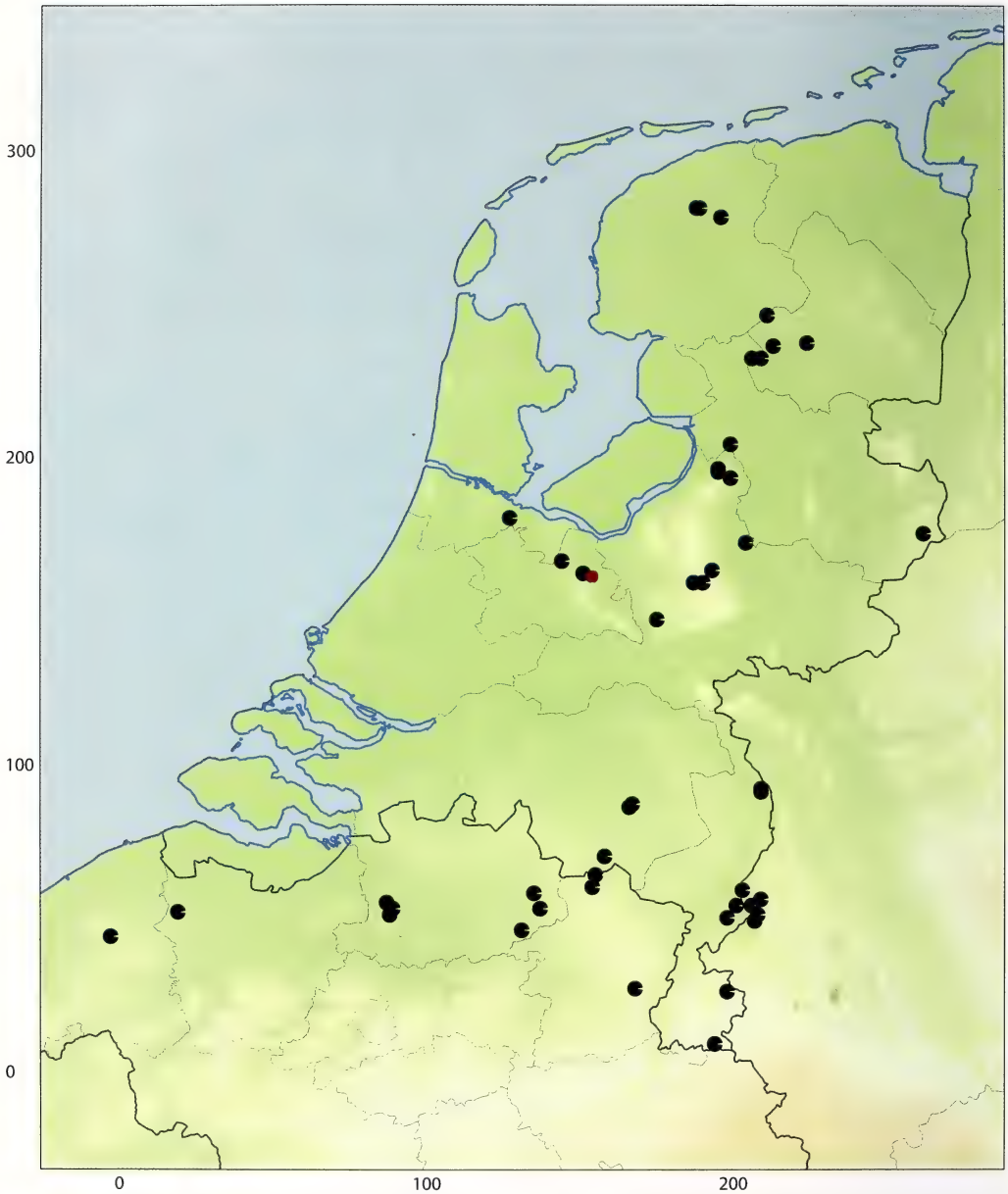


Fig. 35. *Bucculatrix ainsliella*, records in the Netherlands, Belgium and Germany. Red dot denotes first record in 1989 in Amersfoort. For details see Table 1.

(Whitebread 1990). The fact that we found different COI barcode haplotypes even from specimens at a single locality, suggests that multiple individuals have been imported. With the current rate of transportation of goods and people between Western Europe and North America and the ease with which *B. ainsliella* larvae can attach themselves to almost any surface, in combination with the ideal habitat away from home that has been created in Europe by widespread planting *Q. rubra*, it seems that it was only

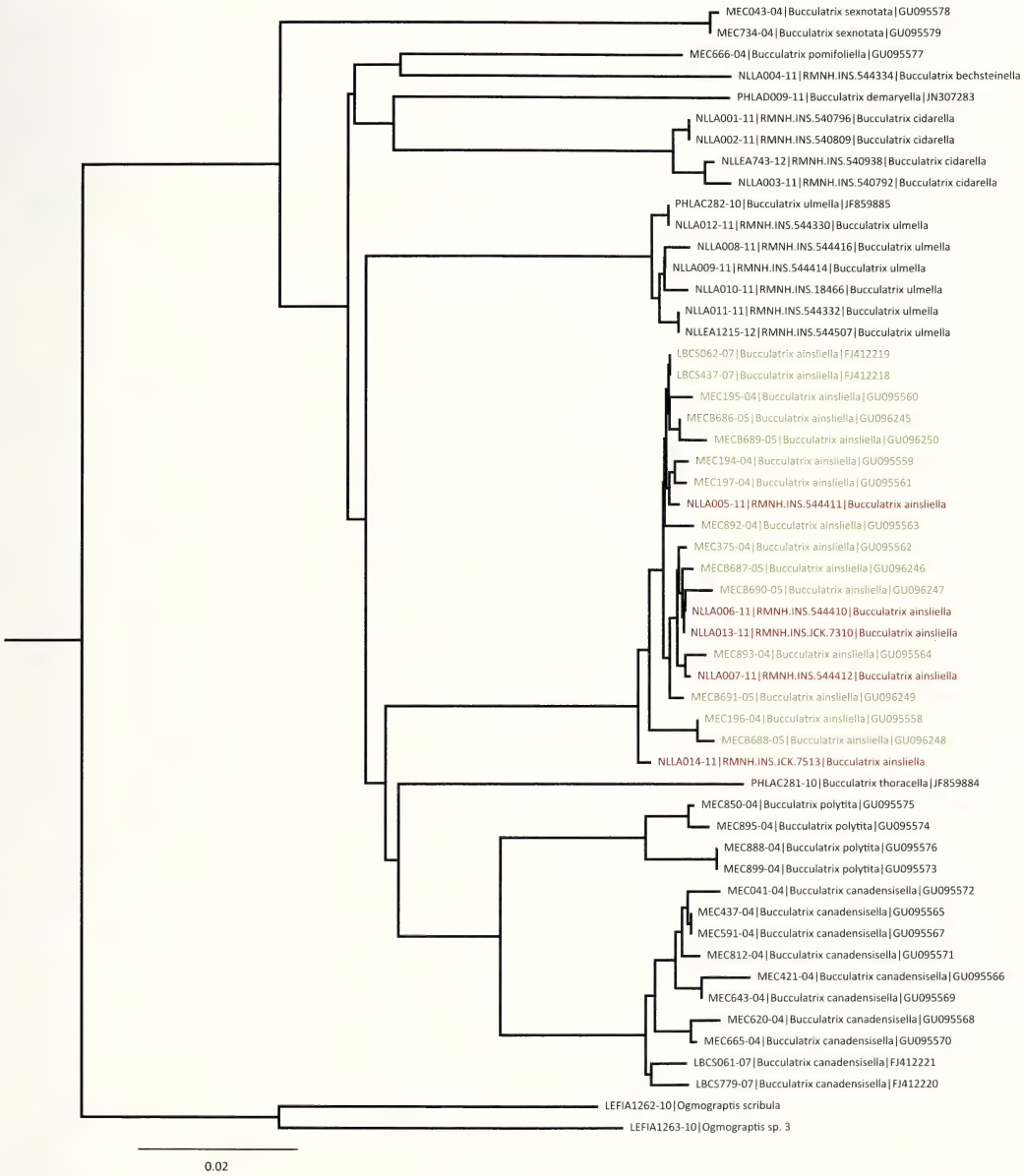


Fig. 36. Neighbor-joining tree of DNA barcodes of Bucculatricidae, using uncorrected P distance. The Australian *Ogmograptis scribula* Meyrick, 1935 is used as outgroup. Red records are Dutch specimens of *B. ainsliella*, green ones are from North America. The following are also North American species: *B. sexnotata* Braun, 1927, *B. pomifoliella* Clemens, 1860, *B. polytita* Braun, 1963, *B. canadensisella* Chambers, 1875. The remainder are European species. Details on vouchers of specimens with a "RMNH.INS" registry number can be found in the BOLD project "Lepidoptera of the Netherlands – public [NLLA]" (http://www.barcodinglife.com). Other public sequences are from other projects, and can be recognised here by the added Genbank Accession number.

a matter of time before this American moth established itself in Europe. There are ever-increasing examples of North American micromoths invading and successfully

establishing in Europe. Examples of recent introductions are in Heliozelidae: *Antispila oinophylla* Van Nieukerken & Wagner, 2012 on *Vitis* (van Nieukerken et al. 2012b), a species of *Coptodisca* on *Juglans* (Bernardo et al. 2012); in Gracillariidae: *Parectopa robiniella* (Clemens, 1863) and *Macrosaccus robiniella* both on *Robinia pseudoacacia* (Whitebread 1990), *Phyllocnistis vitegenella* Clemens, 1859 on *Vitis* (Posenato et al. 1997); in Argyresthiidae: *Argyresthia thuiella* (Packard, 1871) on *Thuja* and other Cupressaceae; and in Gelechiidae: *Coleotechnites piceaella* (Kearfott, 1903) on *Picea* (Lopez-Vaamonde et al. 2010).

Risks?

In North America *Bucculatrix ainsliella* is known to have severe outbreaks from time to time. Especially in British Columbia, where it is introduced, the species has become a nuisance in urban areas due to its abundance, especially when prepupae balloon down from trees and make their cocoons everywhere. In natural habitats, outbreaks are probably a natural phenomenon, followed by years of lower densities when parasitoid populations control their numbers. A similar alteration has been observed in the birch leaf skeletoniser *B. canadensisella* on *Betula* species, which underwent several outbreaks that lasted for two to three years (Friend 1927). In Europe, outbreaks are known from the expanding native species *B. thoracella* on *Tilia* (Kuchlein & Frankenhuyzen 1994), and we have observed similarly abundant ballooning larvae from *Tilia* trees in cities in the Netherlands. Although *B. ainsliella* can be common in places in the Netherlands, we have not yet seen an indication of an outbreak or indications of real foliar damage. Many of the northern red oak trees where we found *B. ainsliella* on, were more visibly damaged by caterpillars of indigenous polyphagous caterpillar and beetle species.

We urge forest entomologists and lepidopterists throughout Europe to look for this species (adults, mines, or cocoons) in order to be able to more fully understand its range expansion across the Palaearctic.

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New faunistic records for a number of Microlepidoptera, including description of three new taxa from Agonoxenidae, Depressariidae, and Gelechiidae (Gelechioidea)

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Abstract. Faunistic data for 48 species of Microlepidoptera from Europe are provided. A total of 35 records are new for certain European countries. Four species are recorded for the first time in Europe: *Spiniphallellus desertus* Bidzilya & Karsholt, 2008 (Gelechiidae), *Hypsopygia almanalis* (Rebel, 1917) (Pyralidae), *Pyrausta tithonialis* Zeller, 1872, and *Mecyna lutulentalis* (Lederer, 1858) (both Crambidae). Three new taxa are described: *Agonopterix socerbi* Šumpich, sp. n. (Depressariidae) from Slovenia, *Chrysoclista abchasica gabretica* Šumpich, ssp. n. (Agonoxenidae) from the Czech Republic, and *Eulamprotes graecatella* Šumpich & Skyva, sp. n. (Gelechiidae) from Greece. The previously unknown female of *Megacraspedus albovenata* Junnilainen, 2010 (Gelechiidae) is also described. *Xenopathia novaki* (Rebel, 1891) (Blastobasidae) is figured for the first time including genitalia of both sexes.

Introduction

Our collecting trips to various parts of Europe have yielded findings regarding a considerable number of species that are noteworthy from ecological, faunistic or other points of view. As the data available are insufficient for a detailed evaluation of the lepidopteran fauna in the visited areas, we only provide the most interesting findings, a number of which are first country records. Furthermore, we collected several specimens that we could not identify as belonging to any known species. Based on their external appearance and the structure of the genitalia, these specimens differ sufficiently from the currently known taxa that they can be considered as being new to science. Here we describe these taxa.

Material and methods

The great majority of the material examined was collected at light. All the specimens are deposited in our private collections, unless stated otherwise (the list of collections is given below). The type material (including holotypes) is deposited in the collections of the authors of descriptions, and in the future they will be moved to the Czech National Museum in Prague. The nomenclature and the species distributions were taken from the current version of Fauna Europaea (Karsholt & van Nieukerken 2011).

Abbreviations

SU	leg. et coll. Jan Šumpich, Česká Bělá, Czech Republic
SK	leg. et coll. Jan Skyva, Prague, Czech Republic
LI	leg. et coll. Jan Liška, Prague, Czech Republic
NHMW	Naturhistorisches Museum Wien, Austria
ZMUC	Natural History Museum of Denmark, Copenhagen, Denmark

Results and discussion

TINEOIDEA: TINEIDAE

Elatobia fuliginosella (Lienig & Zeller, 1846)

Material. **Portugal**, Setúbal distr., Pinhal Novo, 1♀ 22–23.viii.1998, SU. **Czech Republic**, Lanžhot, 1♂ 26.vi.2001, 1♀ 28.vi.2006, 2♂ 17–19.vi.2009, 1♂ 9.vii.2011, 3♂ 30.v–20.vi.2012, SU. **Croatia**, Pelješac penin., Žuljana, 1♂ 1–13.vii.2005, SU; Omiš env., Marušići, 3♂, 2♀ 3–17.viii.2008, SU. **Russia**, Orenburg oblast, Donskoje env., Verbljushka Hill., 1♂ 22–24.vii.2011, SU.

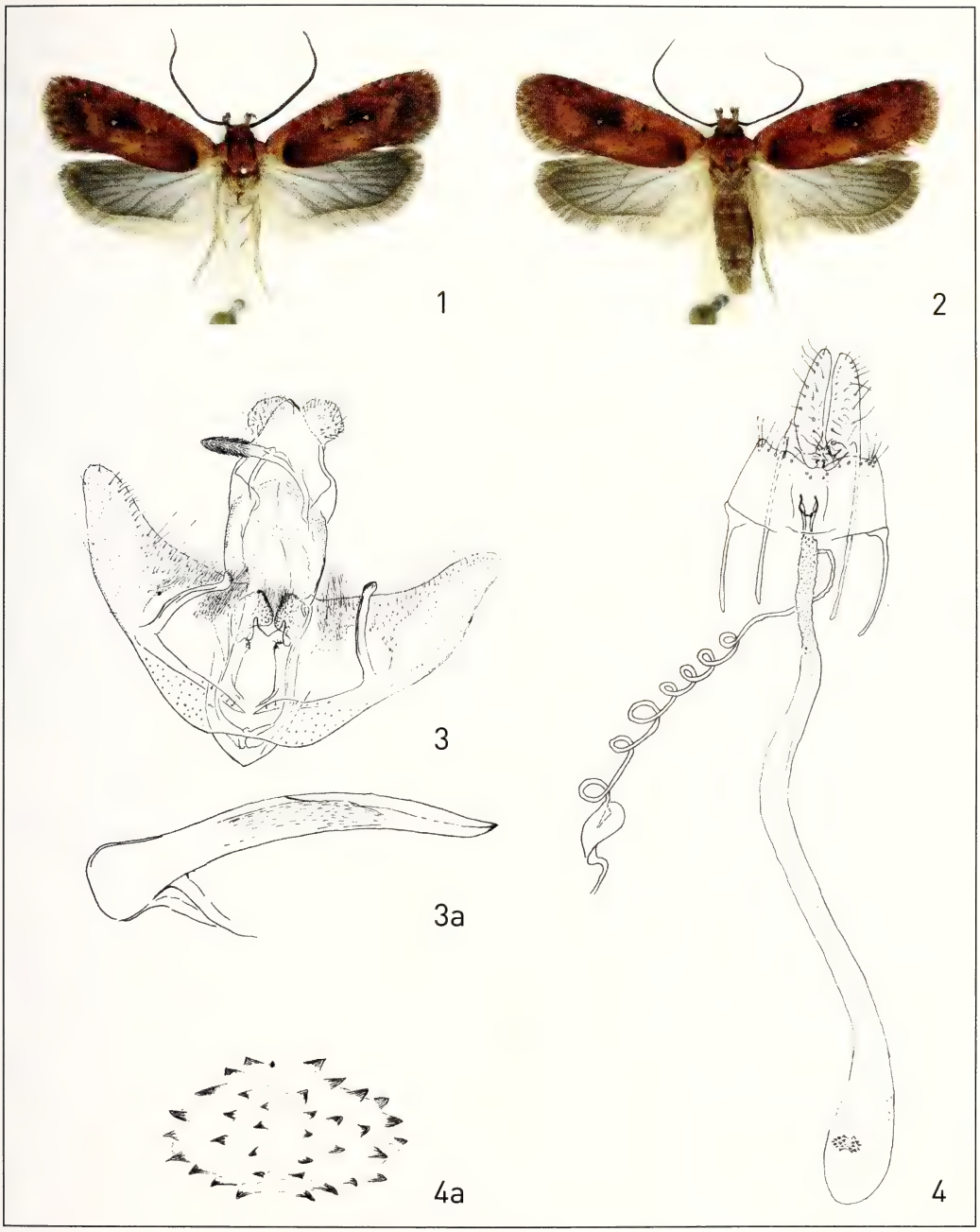
Distributed in Europe but a rare species in general. First country record for Croatia.

GELECHIOIDEA: DEPRESSARIIDAE

Agonopterix socerbi Šumpich, sp. n. Figs 1–4

Material. Holotypus ♂, **Slovenia** 'Slovenia (SLO) | Crni kal – Socerb | 45°35′23″N 13°51′56″E | 6.7.2004 380m | Jan Šumpich leg.', SU; – Paratypes: 1♀, same data as holotypus, SU; 2♀, 'Wipach | 1854', 'ferulae coll Mn.' <handwritten in black ink>, NHMW; 1♂, 'Slovenija | Petrinnjski | kras | 11.8.2002 | lgt. L. Srnka', 'Gen. pr. č. | 9666 | Det. I. Richter ♂', 'Agonopterix | angelicella | det. Z. Tokár, 2006', L. Srnka.

Description. Adult (Figs 1, 2). Wingspan 15–17 mm. Head rust-coloured, frons ochreous yellow. Antenna grey brown, filiform, in male slightly thicker at base and gradually narrowing to apex. Labial palpi cream white, more or less mottled with brown on outer and upper surface, segment 2 unicolourous light on inner surface. Thorax rust-coloured, mottled with lighter and darker scales. Forewing ground colour rusty with a strong tinge of brick-red; base of forewing and proximal half of costal area lighter, reddish; costa lighter with irregular brown maculation; apex and outer margin of forewing darker, rusty brown; termen with a row of indistinct darker spots; distinct distal white spot edged by dark scales and surrounded by a large dark area; four black and white discocellular spots that might not be obvious in some specimens. Legs yellowish, more or less dusted with grey and brownish scales. Abdomen light, greyish. Hindwings light grey, paler basally.
Male genitalia (Fig. 3). Valva very broad at base, gradually narrowing to apex, covered with short hair-like setae; cuiller slightly bent laterally, narrow, very long, with mallet-like apex directed towards top of valva. Tegumen narrow and long; socii relatively small, rounded; gnathos with elongate-oval culcitula. Juxta with two narrow, almost pointed tips. Transtilla lobe very broad, square-like. Phallus narrow, slightly curved, with pointed apex.



Figs 1–4. *Agonopterix socerbi* Šumpich, sp. n. **1.** Male, holotype. **2.** Female, paratype. **3.** Male genitalia, a: phallus. **4.** Female genitalia, a: signum (enlarged).

Female genitalia (Fig. 4). Papillae anales narrow and long, as a whole large. Ostium bursae small, circular; ductus bursae long, very narrow and only very slightly broadening towards corpus bursae; corpus bursae very narrow, oval; signum oval with short spines.

Differential diagnosis. The newly described species is distinctive in having conspicuous brick red colouration, and in combination with its characteristic structure of genitalia (especially in males having long cuiller exceeding the margin of valva) can be easily distinguished from the hitherto known species of the genus *Agonopterix* Hübner, 1825.
Distribution. Only known from southwestern Slovenia.
Life history. Early stages and host plant unknown. We captured the moths at ultraviolet light (fluorescent lamp 8W/12V) in open grassy steppes.
Derivatio nominis. Named after the type locality Socerb near Crni Kal in Slovenia.
Remarks. In the author's (SU) collection this conspicuous species was kept among unidentified species for a number of years as the author had not succeeded in finding the proper name for this species in the literature available. Collections of some major European museums (e.g., London, Munich) were also examined for this species, and two specimens were eventually found in the Vienna museum (NHMW), misidentified as *A. ferulae* (Zeller, 1847).

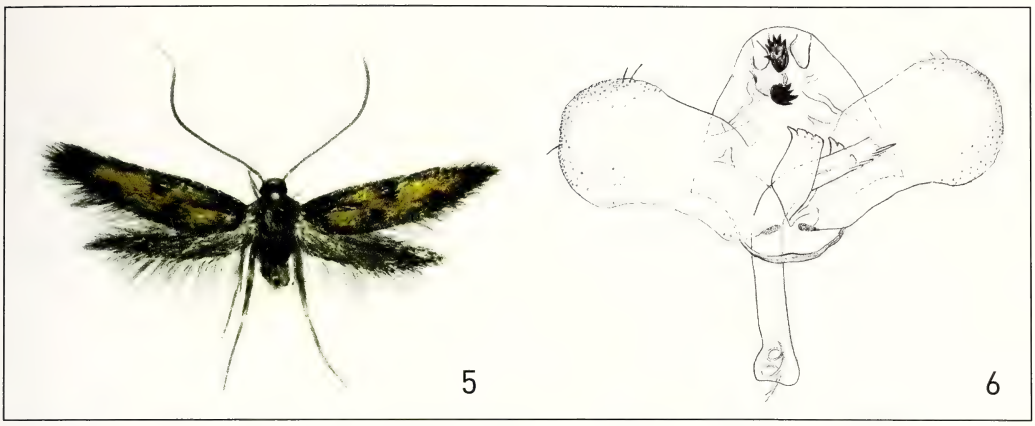
GELECHIOIDEA: AUTOSTICHIDAE

Symmoca caliginella Mann, 1867
Material. **Slovenia**, 1♂, Osp, 26.iv.2002, SU; 3♂, Julijske Alpe, Mangart (1,600 m), 24.vii.1997, LI.

GELECHIOIDEA: AGONOXENIDAE

***Chrysoclista abchasica gabretica* Šumpich, ssp. n.** **Figs 5, 6**
Material. Holotypus ♂, **Czech Republic** 'Bohemia mer.[idionalis] (CZ) | Šumava M[oun]t[ain]s. – 1195 m | Smrčina – Seitz.[ova] cesta | 48°45′01″N 13°55′41″E | 19.9.2005 | Jan Šumpich leg.'.

Description. Adult (Fig. 5). Wingspan 10.5 mm. Head and thorax grey with metallic shine. Labial palpus covered with brown grey, shiny scales. Antenna filiform, grey brown, paler at apex. Forewing ground colour light orange but with strong admixture of brown scales. Forewing edged with dark scales that form dark areas at base, at apex and at outer third of posterior margin of forewing. A narrow, straight and rather long black streak, admixed with silver scales, extending from base of forewing to costal spot. Costal spot circular, dark, with noticeable admixture of silver scales, other two spots (with very few silver scales) evenly placed at inner margin of the wing. Hindwing brown grey, narrow, pointed at apex. Legs light, dusted with brownish scales.
Male genitalia (Fig. 6). Very similar to those of *Ch. abchasica abchasica*, which are illustrated in Sinev (1986) and Koster & Sinev (2003). Valva broad, evenly broadly rounded at apex. Phallus narrow, moderately curved at 2/3 and ended with five thorn-like protuberances; cornuti present, forming short row of beads. Branches of gnathos ending with strongly sclerotised structures in the form of teeth. Anellus lobes very well developed, shaped similarly to those of *Chrysoclista zagulajevi* Sinev, 1986 but differing in apical structure – in *Ch. zagulajevi* the apex is irregularly toothed, in *Ch. abchasica gabretica* ssp. n. with regular serrated teeth.



Figs 5–6. *Chrysoclista abchasica gabretica* Šumpich, ssp. n. **5.** Male, holotype. **6.** Male genitalia.

Female genitalia. Unknown.

Differential diagnosis. The newly described subspecies is in habitus very similar to *Chrysoclista abchasica abchasica* Sinev, 1986 described from Georgia (Western Transcaucasia), from which it can be distinguished by features of genitalia; the easiest distinguishing feature is markedly different shape of anellus lobes, and also more evenly rounded valva, bigger apical lobes of tegumen and rather different shape of cornutus. However, as both taxa are known only from a single specimen and possible variation within populations thus is unknown, we are hesitant to consider the new taxon a new species at this stage.

Distribution. Known only from southern Bohemia (Czech Republic).

Life history. Unknown. The holotype was collected in a climax spruce stand in the highest altitudes of the Bohemian Forest Mts (1,195 m a.s.l.).

Derivatio nominis. The subspecies name is derived from the Latin name of the mountains where the type material was found (Gabreta = Bohemian Forest Mts).

Remarks. After having collected the holotype, an effort has been made in the same locality to obtain further specimens but without any success. In the Czech Republic, species of *Chrysoclista* are very rarely encountered in general: *C. lathamella* (Fletcher, 1936) and *C. splendida* Karsholt, 1997 have been found only as single specimens, for *C. linneella* fewer than ten findings have been published. With respect to these difficulties, the subspecies *gabretica* is thus described from this single specimen, as was the case of the nominotypical subspecies.

GELECHIOIDEA: OECOPHORIDAE

Esperia sulphurella (Fabricius, 1775)

Material. **Slovenia**, 1♀, Crni kal, 26.iv.2002, SU.

The occurrence in Central Europe is documented only by very old records from Germany, Austria, and Poland (Tokár et al. 2005). The present record is first for Slovenia.

GELECHIOIDEA: COSMOPTERIGIDAE

Pyroderces klimeschi Rebel, 1938

Material. **Italy**, 1♂, Venice, Chióggia, Rosapineta, 15–17.v.1992, SK. **Czech Republic**, Lanžhot, 1♂ 29.v.2012, LI, 3♂ 22.vi.2012, SU. **Slovakia**, 1♂, Nová Vieska, 15.vii.1994, SK. **France**, 1♂, Corsica, Bastia-Poretta, Plage de Pineto, 12.vi.1993, LI.

A rare species distributed mainly in Central Europe, with very few published faunistic data. New species for France (known only from Corsica).

GELECHIOIDEA: BLASTOBASIDAE

Xenopathia novaki (Rebel, 1891) Figs 7–10

Material. **Croatia**, Pirovac env., Tijesno, 2♀ 15–17.vii.2003, 1♂, 1♀ 6–12.viii.2007, SU; 1♂, Pelješac penin., Žuljana, 1–13.vii.2005, SU. **Greece**, 1♂, Párga-Agia Kiriaki, 13.viii.2002, SK.

Described from a single male taken in the vicinity of Split (Rebel 1891). No further findings have been published until now. As images of the species are not available elsewhere, here we provide photographs of adults (Figs 7, 8), as well as figures of genitalia of both sexes (Figs 9, 10). New species for Greece.

Blastobasis pannonica Šumpich & Liška, 2011

Material. **Russia**, 3♂, Orenburg oblast, Kidriasovo, 20–21.vii.2011, SU.

Recently separated from *Blastobasis phycidella* (Zeller, 1839). The two species often occur in sympatry. The distribution range of both taxa could be more exactly defined only by a thorough review of the existing collection material. First country record.

GELECHIOIDEA: GELECHIIDAE

Megacraspedus albovenata Junnilainen, 2010 Figs 11, 12

Material. **Slovakia**, Štúrovo env., Modrý vrch Hill, 1♂ 11.vii.1996, leg. I. Dvořák, coll. SU, 1♂ 11–13.vii.1999, SU.

Recently described from the southern Urals (Orenburg area; in the current version of Fauna Europaea, the area 'Russia Central' is incorrectly given). Soon afterwards recorded also in Central Europe, namely in the Czech Republic (Šumpich et al. 2011); as the female was previously unknown and now females were found among numerous specimens collected in the Czech locality (the vicinity of Znojmo), a description of the female is included here. The present records are first for Slovakia.

Description. Female (Fig. 11). Body size and wing colour pattern agree with those described for males in the original species description by Junnilainen & Nupponen (2010). Females only differ in shape of forewing, which is more pointed apically and more arc-shaped anteriorly than in males.

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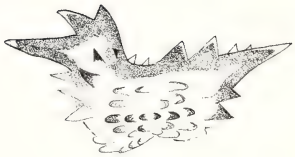

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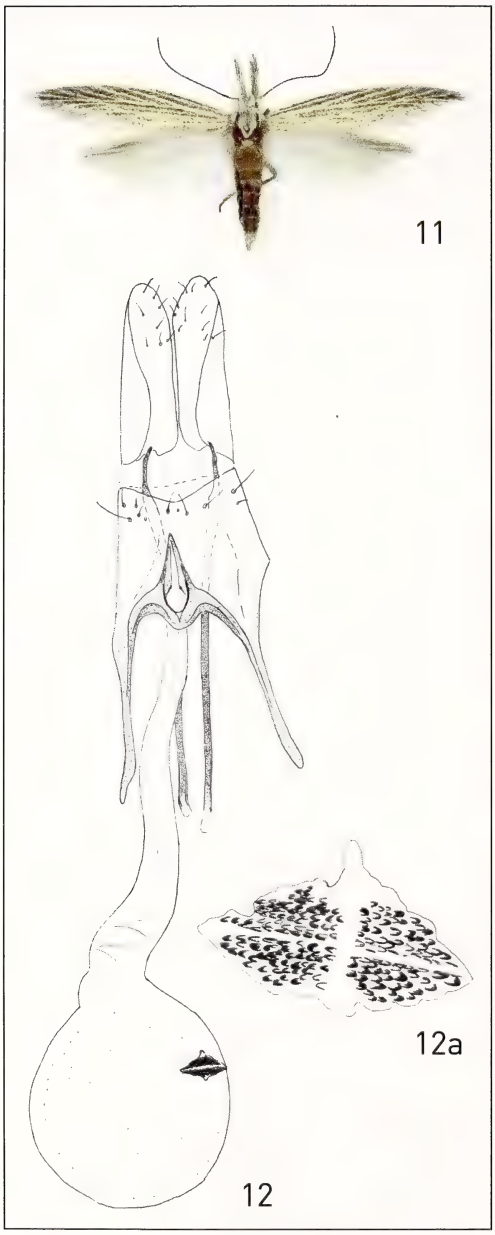
Figs 7–10. *Xenopathia novaki* (Rebel, 1891). **7.** Male (12 mm). **8.** Female (12 mm). **9.** Male genitalia. **10.** Female genitalia, **a**: signum (enlarged).

Female genitalia (Fig. 12). Papillae anales broad, large, as long as apophyses anteriores. Apophyses anteriores strong, relatively short, approximately 2.6 times shorter than apophyses posteriores. Ostium bursae triangular, sclerotised on sides, pointed proximally. Ductus bursae slightly broadening towards corpus bursae. Corpus bursae almost spherical; signum square-shaped with irregularly cut-out margins, folded diagonally at about 30° angle and scaly sclerotised on inner side.



Figs 11–12. *Megacraspedus albovenata* Junnilainen, 2010 (Czechia, Ječmeniště near Znojmo, 11.vi. 2011, J. Šumpich leg.). **11.** Female. **12.** Female genitalia, a: signum (enlarged).

Aristotelia decoratella (Staudinger, 1879)

Material. **Slovakia**, Slovenský kras, Plešivec-Ďulová, 2♂, 2♀ 10.viii.2010, LI; 1♂ 7–9.vii.2011, LI. **Croatia**, 2♂, Biograd, 5–12.vii.2003, SU; 5♂, 1♀, Pirovac env., Tijesno, 6–12.viii.2007, SU; 1♂, 1♀, Pelješac penin., Žuljana, 1–13.vii.2005, SU. **Greece**, 1♂, Peloponnes penin., Chelmos, 9–10. viii.2002, SK; 1♂, Peloponnes penin., Diakoftó, 8–9.viii.2002, SK; 1♂, Kastória distr., Vissinea, 10.vii.2005, SK. **Bulgaria**, 1♂, Sandanski, 29–31. viii.1978, SK.

Widespread in Southern Europe. From the Balkan Peninsula reported from Bulgaria, and single records from Greece and Croatia are included in Elsner et al. (1999), where by mistake 'Spalato' [= Split], a Croatian locality, was by mistake considered to be Italian. Considering the shortage of publicly available records (the occurrence in Greece and Croatia is not mentioned in the current version of Fauna Europaea), we have added a few of our own findings here.

Metzneria littorella (Douglas, 1850)

Material. **Slovenia**, 1♂, Kozina env., Prešnica, 20.vii.2011, SK; Tublje pri Hrpeljach, 1♂ 1.vi.1998, SK, 2♂, 1♀ 24.v.1999, SK et LI; Crni kal – Socerb, 1♀ 2.vi.1998, SK, 7♂, 4♀ 23.v.1999, SK et LI.

Distributed in Western Europe, also recorded in Russia and Cyprus. First country record for Slovenia.

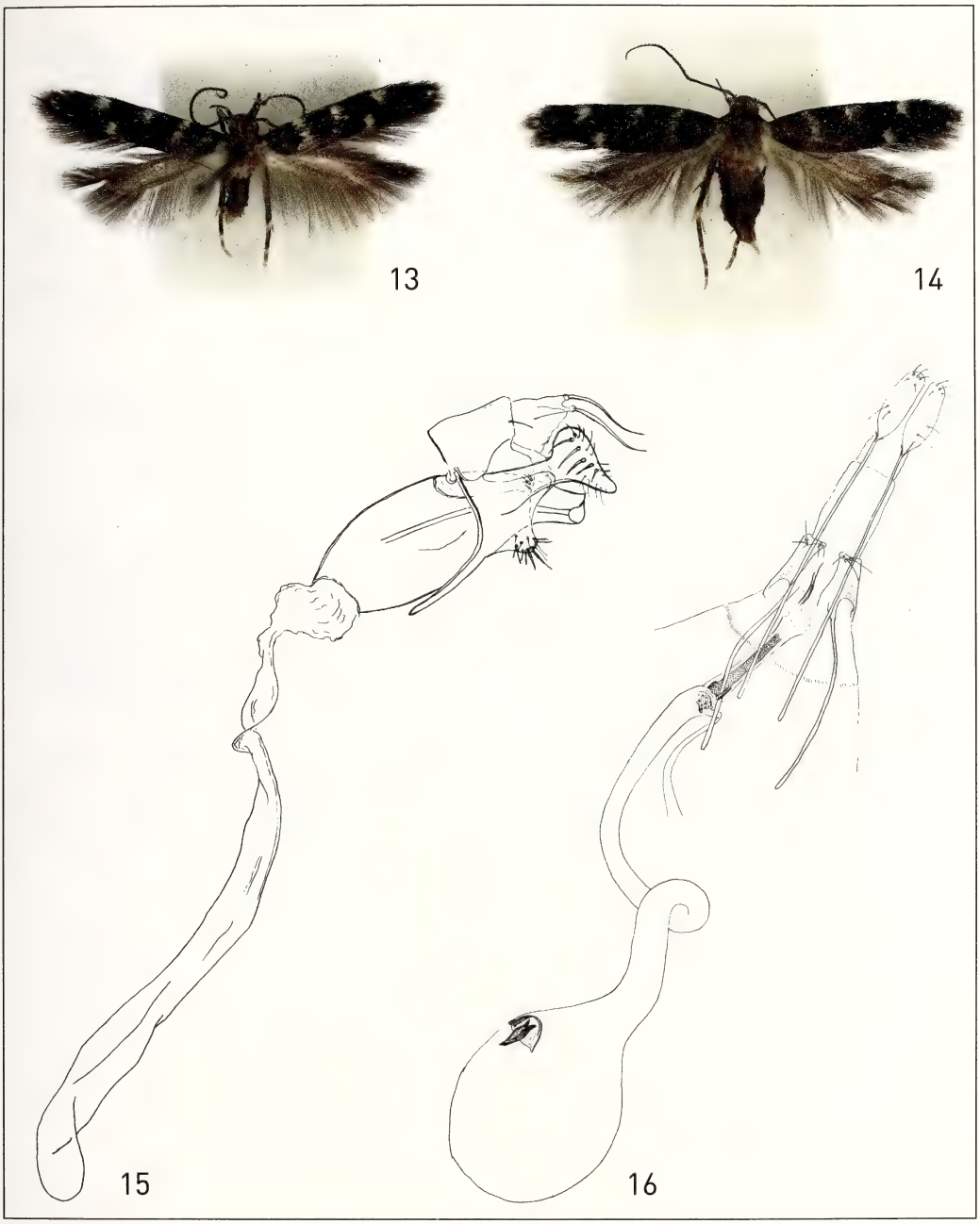
Monochroa palustrella (Douglas, 1850)

Material. **Greece**, 3♂, Mesangala, 6.vi.2006, leg. J. Procházka, coll. SK.

Previously known only from more northern parts of Europe, from Great Britain through Central and Northern Europe to Russia. First record from the Balkans, a new species for Greece.

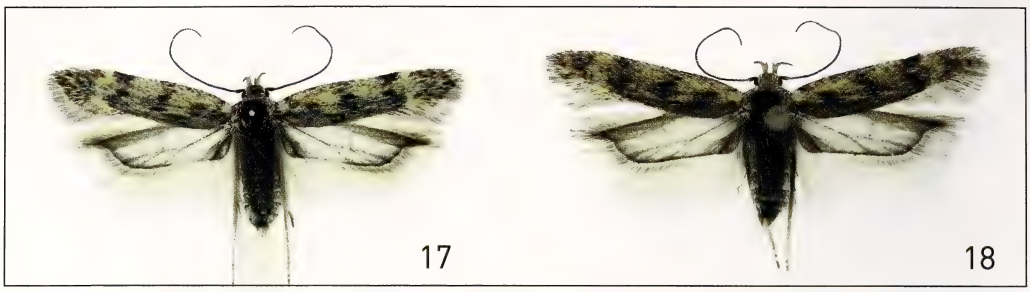
Eulamprotes graecatella Šumpich & Skyva, sp. n. Figs 13–16

Material. Holotypus ♂, **Greece** 'Hellas | Igoumenitsa | 5km west, 10 m | 28.6.2001 | J. Skyva lgt.' coll. SK. – Paratypes: 1♂, 1♀, same data as holotypus, ♀ in coll. SK, ♂ in coll. SU; 1♀, 'Greece | Plataria | 12 km S Iguminitsa, 5 m | 29.vii.1977 | M. Fibiger leg.', ZMUC; 1♂, 'Greece | Evro, Kavisos, 100 m | 22.–23. viii.1985 | M. Fibiger leg.', 'GU 86/422' <genitalia slide P. Huemer>, ZMUC.



Figs 13–16. *Eulamprotes graecatella* Šumpich & Skyva, sp. n. **13.** Male, holotype. **14.** Female, paratype. **15.** Male genitalia. **16.** Female genitalia.

Description. Adult (Figs 13, 14). Wingspan 10 mm in males, 12 mm in females. Head brown-grey. Segment 2 of labial palpus brown, with pale apex; last segment light, on inner and outer side covered with band of brown scales. Antenna brown-grey, filiform. Legs brown, joints paler on tips. Forewing dark grey-brown with four light,



Figs 17–18. *Spiniphallellus desertus* Bidzilya & Karsholt, 2008 (Russia). **17.** Male (17 mm). **18.** Female (18 mm).

whitish spots (without any shiny silver scales), less distinct in female. First spot connecting costa with hindmargin of wing near wing base, two spots placed on costa (one in middle of wing and one near apex), last spot at inner margin of distal part of the wing. Hindwings, as well as fringes of both wings, brown grey.

Male genitalia (Fig. 15). Uncus narrow, distinctly concave at apex, with two long setae. Valva hammer-shaped apically, apex rounded in cranial direction, elongated in caudal direction. Sacculus small, rounded, covered with tiny setae. Saccus long, broader at base, tapering towards pointed apex. Phallus bulbous, without spines. Bulbus ejaculatorius very long, narrow, moderately broadening to apex. Segment VIII with pair of long coremata.

Female genitalia (Fig. 16). Apophyses posteriores long, 1.6x longer than apophyses anteriores. Ostium bursae narrow, membranous; antrum narrow, long, moderately sclerotised, in lower part with tiny line-like sclerites. Ductus bursae membranous, long, moderately broadening towards corpus bursae, twisted in lower half, distinctly sclerotised at entry of ductus seminalis. Corpus bursae very slightly oval, signum as a pointed spike hidden under half-sphere shelter.

Differential diagnosis. *Eulamprotes graecatella* sp. n. resembles in wing pattern some other species of *Eulamprotes* Bradley, 1971 by having white spots on dark ground, e.g., *E. wilkella* (Linnaeus 1758); however, the new species differs by having a longitudinal spot near base of forewing connecting costa with hindmargin of wing (in other species this spot does not reach the wing margin). The unique features by which it can be distinguished from all other congeners are the shape of valvae and the apex of uncus with two long setae in the male, and the form of antrum and signum in the female.

Distribution. Greece.

Life history. Early stages and host plant unknown. The moths were taken in a salt marsh by the sea coast at the end of June.

Derivatio nominis. The species name is derived from the name of the country from which it is described, i.e. Greece.

Spiniphallellus desertus Bidzilya & Karsholt, 2008 — Figs 17, 18

Material. **Russia**, 7♂, 17♀, Orenburg oblast, Kidriasovo, 21.vi.2009, SU; 2♂, Cheliabinsk oblast, Orenburg oblast, Donskoje env., Verbljushka Hill., 24–28.vi.2009, SU; 3♂, Cheliabinsk oblast, Kizilskoye, 20.vi.2009, SU.

Figs 19–20. Males. **19.** *Ornativalva heluanensis* (Debski, 1913) (Greece, 12 mm). **20.** *Gladiovalva aizpuruai* Vives, 1990 (Russia, 17 mm).

Recently described from Uzbekistan, Turkmenistan, and Kazakhstan (Bidzilya & Karsholt 2008). New species for Russia as well as for Europe.

***Ornativalva heluanensis* (Debski, 1913)** **Fig. 19**

Material. **Spain**, Alicante distr., Santa Pola, 5♂, 7♀ 26–27.ix.2005, 1♂, 2♀ 12.vi.2007, SU; 4♂, Alicante distr., Salinas, 25.ix.2005, SU; 1♀, Alméria distr., Níjar, 13–14.vi.2007, SU; Cabo de Gata, Retanar, 30.vii.2005, leg. V. Červenka, coll. SK. **Greece**, Igoumenitsa, 7♂, 2♀ 9.v.2002, 4♂, 11♀ 14.viii.2002, 13♂, 4♀ 5.vii.2005, 6♂, 5♀ 14.vii.2005, 1♀ 5.viii.2005, SK; 1♂, Mesangala, 6.vi.2006, leg. J. Procházka, coll. SK.

Occurring from the Iberian Peninsula to Russia; from the Balkans previously known only from the Croatian coast. New species for Greece.

***Gladiovalva aizpuruai* Vives, 1990** **Fig. 20**

Material. **Czech Republic**, Bohemia, Církvice, 2♂ 17.vii.2004, leg. M. Žemlička, coll. SU, 18♂ 14.vii.2010, leg. M. Žemlička, coll. SU; 2♂, 1♀, Moravia, Lanžhot, 9–23.vii.2005, SU; 1♀, Moravia, Bzenec-Váté písky, 31.vii.2003, LI. **Greece**, 1♀, Kastória distr., Vissinea, 10.vii.2005, SK. **Russia**, 1♂, Orenburg oblast, Kidriasovo, 20–21.vii.2011, SU; 2♂, Cheliabinsk oblast, Moskovo, 15–18.vii.2011, SU.

Previous published records only from Spain, from where it was described, and from Central Europe (Czech Republic, Slovakia, and Hungary). New species for Greece and Russia.

***Xenolechia pseudovulgella* Huemer & Karsholt, 1999**

Material. **Greece**, 1♀, Párga, Agia Kiriaki, 13.viii.2002, SK; 1♀, Peloponnes penin., Diakoftó, 19–25.vi.2001, SK.

Described from Greece and Turkey (Huemer & Karsholt 1999). Present records are the only published data apart from the type localities.

***Istrianis femoralis* (Staudinger, 1876)**

Material. **Slovenia**, Osp, 12♂, 2♀ 2.v.2002, SU, 1♂, 2♀ 28.vi.2002, SU, 2♂ 26.v.2001, LI, 3♂, 1♀ 26.iv.2002, LI, 1♂ 25.viii.2011, LI; 2♂, Crni kal, 24.vii.1997, LI. **Croatia**, 22♂, 18♀, Island of Pag, Novalja – Potočnica, 26–30.viii.2001, SU; 1♂, 1♀, Omiš env., Marušići, 3–17.viii.2008, SU; 3♂, Pirovac env., Tijesno, 6–12.viii.2007, SU.

Distributed in Southern and Southeastern Europe, also recorded from Ukraine. New species for Slovenia.

Figs 21–22. *Schneidereria pistaciella* Weber, 1957. **21.** Male (8 mm). **22.** Female (8.5 mm).

Fig. 23. *Altenia elsneriella* Huemer & Karsholt, 1999, male (Croatia, Island of Pag, 11.5 mm).

Schneidereria pistaciella Weber, 1957 — Figs 21, 22

Material. **Croatia**, 3♂, 11♀, Omiš env., Marušići, 3–17.viii.2008, SU; 2♂, 2♀, Pirovac env., Tijesno, 6–12.viii.2007, SU; 1♀, Biograd env., Turanj, 22–27.viii.2004, SU.

Described from specimens collected in Syria (Damascus) (Weber 1957). Recently also recorded in Europe, namely in Ukraine, Cyprus, and Greece (Huemer & Karsholt 2001). New species for Croatia.

Altenia elsneriella Huemer & Karsholt, 1999 — Fig. 23

Material. **Croatia**, 1♂, Island of Pag, Novalja – Potočnica, 26–30.viii.2001, SU; 3♂, 1♀, Island of Krk, Risika, 25–29.vi.2000, LI. **Greece**, 1♀, Peloponnes penin., Diakoftó, 3–6.v.2002, SK.

Previously known only from type localities in Croatia, Greece, and the Republic of Macedonia (Huemer & Karsholt 1999), found also on the Island of Krk (Habeler 2003). Here, additional findings from Croatia and Greece are presented.

Streyella anguinella (Herrich-Schäffer, 1861)

Material. **Slovenia**, 4♂, 1♀, Podgorje env., Debeli hrib, 8.vii.2006, SK; **Spain**, 4♂, Alméria, Sierra de los Filabres, Alto del Calar del Gallinero, 17–18.vi.2007, SU. **Russia**, 1♂, Orenburg oblast, Kidriasovo, 21.vi.2009, SU.

Widespread mainly in Eastern and Southeastern Europe and also in Near East countries. From Western Europe only known from Spain, in Central Europe only known from recent records in Hungary. New species for Slovenia.

Caryocolum klosi (Rebel, 1917)

Material. **Slovenia**, 1♀, Trnovski Gozd Mts, Predmeju env., 29.vi.2002, SU; 1♀, Nanos Mts, Podnanos env., 7.vii.2006, SK.

Figs 24–25. *Stomopteryx basalis* Staudinger, 1876 (Croatia). **24.** Male (14 mm). **25.** Female (17 mm).

Distributed largely in Central Europe, also recorded from France, Romania, and Greece (Karsholt 2005). First country record.

Stomopteryx basalis (Staudinger, 1876) Figs 24, 25

Material. **Croatia**, 17♂, 7♀, Omiš env., Marušići, 3–17.viii.2008, SU; Pirovac env., Tijesno, 2♂ 15–17.vii.2003, 1♂ 23.viii.2004, 15♂, 4♀ 6–12.viii.2007, SU; 6♂, 2♀, Pelješac penin., Žuljana, 1–13. vii.2005, SU; 1♀, Biograd env., Pakoštane, 15–17.vii.2003, SU.

Known from scattered localities in Southern Europe, previously reported from Croatia only from the Island of Krk (Habeler 2001).

Nothris congressariella (Bruand, 1858)

Material. **Spain**, 1♂, Aragon, Albarracín, 19.vi.2007, SU; 1♂, Huelva, Coto de Doñana, Matalascañas, 24.v.1999, leg. M. Dvořák, coll. SU. **Croatia**, 15♂, 11♀, Omiš env., Marušići, 3–17.viii.2008, SU. **Greece**, Peloponnes penin., Kamares, Ano Salmonikos, 1♂ 6.v.2002, 1♀ 22.x.2003, SK.

Known from Western, Southern and Southeastern Europe.

Anacampsis populella (Clerck, 1759)

Material. **Greece**, 1♀, Mesangala, 8.vi.2006, leg. J. Procházka, coll. SK.

Widespread throughout Europe but previously not known from Greece. First country record.

Dichomeris rasilella (Herrich-Schäffer, 1854)

Material. **Spain**, Teruel distr., Albarracín, 1♂ 4.vii.2004, leg. J. Procházka, coll. SK, 1♂ 23.ix.2005, SU; 1♂, Zaragoza distr., Castejón de Monegros, 10.vi.2007, SU. **Hungary**, Örkény, 1♂ 26.vii.1983, SK, 1♂ 22.vi.1989, SK, 2♂ 16–17.viii.2000, SK et LI, 1♂ 13.vii.2002, SK, 2♂, 2♀ 16.vi.2006, SK, 15♂, 2♀ 16.ix.2005, SU, 1♂ 16.ix.2006, SK, 4♂ 27.vii.2007, SK. **Czech Republic**, 1♂, Bohemia, Milá, 27–28.v.1993, SK; 4♂, Bohemia, Raná, 27.v.1993, SK; 1♂, 2♀, Bohemia, Stroupeč, 19.vi.1998, SK; Bohemia, Břvany – Písečný vrch, 1♀ 21.vii.1995, SK, 3♂ 7.vi.2003, SU, 4♂ 26.vii.2004, SU, 1♂ 18.vi.2005, SU; 1♀, Moravia, Pálava Hills, Děvín, 9.ix.2005, SU. **Slovakia**, 1♂, Chleb, 14.ix.1994, SK; 1♂, Kamenín, 10.vii.1994, SK; 1♂, Kamenica nad Hronom-Čenkov, 5.ix.1991, LI; 1♂, Slovenský kras Karst, Plešivec-Ďulová, 7–9.vii.2011, LI. **Greece**, 1♀, Mesangala, 8.vi.2006, leg. J. Procházka, coll. SK. **Bulgaria**, 1♀, Belogradčik, 22.v.1977, SK.

Widely distributed but within Europe more common only in its western part (mainly in Spain) and in a limited number of localities in Central Europe (Hungary, northern

Bohemia). Previously not known from Southeastern Europe; new species for Greece and Bulgaria.

TORTRICOIDEA: TORTRICIDAE

Phtheochroa reisseri (Razowski, 1970)

Material. **Croatia**, 1♂, Senj distr., Sveti Juraj, 29.iv.2002, SU. **Bulgaria**, 1♀, Arkutino, 30.v–1.vi. 1977, SK.

Described from Crete (Omalos). Later recorded only in southern France (Briançon env.) (Huemer & Luquet 1991) and Croatia (Island of Krk) (Habeler 1998). New species for Bulgaria.

Cochylimorpha hilarana (Herrich-Schäffer, 1851) **Figs 26, 27**

Material. **Greece**, 2♂, 9♀, Piéria, Kalivia Varikou, 18.viii.1996, SK.

In Europe widely distributed but previously no record was published from the Balkans. Concerning the material we examined, the collection date as well as the smaller wingspan, which does not exceed 14 mm, indicate that they likely belong to the second generation (in Central and Northern Europe the species has only one generation). Having compared these Greek specimens with those from the Czech Republic, the Greek moths appear to have a paler colouration, which is particularly obvious in hindwings (they are whitish in both sexes). No demonstrable differences were found in genitalia. New species for Greece.

Pelatea klugiana (Freyer, 1836)

Material. **Slovenia**, 1♂, Nanos, Strmec (700 m), 25.v.2001, LI. **Bulgaria**, 1♀, Belogradčik, 22.v.1977, SK.

Distributed from Spain through Central Europe to Russia where it was discovered only recently (Nedoshivina & Zolotuhin 2005). Its presence in the Balkans, namely Croatia, is mentioned only by Razowski (2003). New species for Bulgaria.

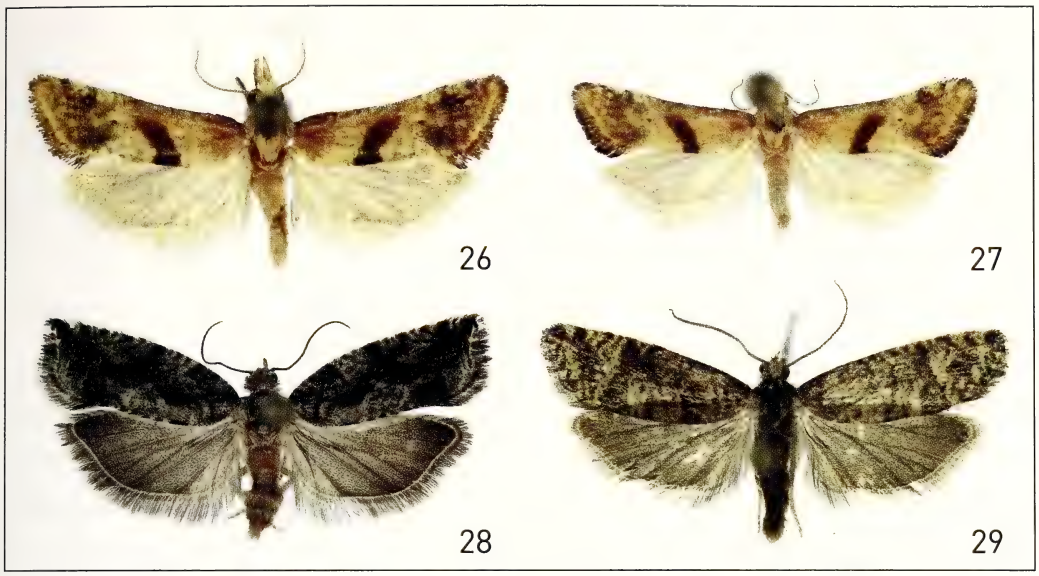
Epinotia nigristriana Budashkin & Zlatkov, 2011 **Fig. 28**

Material. **Greece**, 10♂, 3♀, Thrakia, Kirki distr., Kassitera env., 8–9.xi.2011, SK et SU.

Very recently described from southwestern Bulgaria, where it was found on dry, rocky steppes (Budashkin & Zlatkov 2011). Our material from Greece came from forests with deciduous oak species (predominantly with *Quercus pubescens*) where the moth was quite abundant despite very low night temperatures. This species has very likely been overlooked due to the very late adult flight (October to November) but locally it may be abundant; that is why a wider distribution can be expected in Southeastern Europe. New species for Greece.

Eucosma caliacrana (Caradja, 1931)

Material. **Bulgaria**, Arkutino, 1♀ 7–9.IX.1978, SK, 2♂, 2♀ 16.VIII.1982, LI.



Figs 26–29. Adults of Tortricidae. **26–27.** *Cochylimorpha hilarana* (Herrich-Schäffer, 1851) (Greece). **26.** Male (15 mm). **27.** Female (12 mm). **Fig. 28.** *Epinotia nigristriana* Budashkin & Zlatkov, 2011, male (Greece, 17 mm). **Fig. 29.** *Rhyacionia hafneri* (Rebel, 1937), male (Russia, 17.5 mm).

A rare species known from Eastern Europe, with a limited number of publicly available records.

Rhyacionia hafneri (Rebel, 1937) Fig. 29

Material. **Hungary**, 2♂, Vértes, Csákberény, 8.v.2003, LI. **Russia**, 1♀, Cheliabinsk oblast, Satka env., 17.vi.2009, SU.

Very local species with limited information about its distribution range. The occurrence was previously confirmed in Central Europe and the Balkans but the record from the southern Urals indicates that its range is much more wider. New species for Russia.

Rhyacionia maritimana Pröse, 1981

Material. **Spain**, 3♂, 1♀, Catalunya, Reus env., 29–30.v.1996, SU; 9♂, Alméria, Sierra de los Filabres, Alto del Calar del Gallinero, 17–18.vi.2007, SU; 1♂, Cuenca, Monteagudo de las Salinas, 6.v.2008, SU. **France**, 1♂, Toulon distr., Fort du Girardon, 11.v.1994, SK; 1♂, Sommiéres distr., Maruéjols, 17–18.v.2004, SU.

Distributed in Southwestern Europe, with published faunistic data from Corsica (the type area) and Spain. The occurrence in continental France is mentioned only by Razowski (2003) but without faunistic details. As the species is missing in the current checklist of Lepidoptera for France (Karsholt & van Nieukerken 2011) we have included our own findings from the south of the country.

PTEROPHOROIDEA: PTEROPHORIDAE

Capperia polonica Adamczewski, 1951

Material. **Slovenia**, Osp, 1♂ 25.v.2001, SK, 2♂ 2.v.2002, SU, 2♂ 3.vii.2004, SU, 2♂ 25.vi.2010, SK.

Previously known from Croatia, Greece, France, Corsica, and Sardinia. First records from Slovenia.

PYRALOIDEA: PYRALIDAE

Hypsopygia almanalis (Rebel, 1917)

Material. **Greece**, 1♂, 1♀, Piéria, Leptokária, 17–22.viii.1996, SK; 1♂, Préveza, Mitikas, 27.vi.2001, SK.

Described from Turkey, known also from Cyprus (Slamka 2006). The specimens included herein were collected in coastal dunes and represent first records from Europe.

Stemmatophora brunnealis (Treitschke, 1829)

Material. **Italia**, 1♂, Lago di Como, Menaggio, 27.viii.2008, LI. **Corsica**, 1♀, Aullene env., Eustach, 25.vii.2007, leg. A. Pavlíčko, coll. SK.

Widely distributed and generally common Southern European species, which was overlooked in Corsica. New species for this island.

Pyralis lienigialis (Zeller, 1843)

Material. **Corsica**, 1♀, Sartene, 17.vi.1993, SK; 2♂, Sainte Lucia di Porto Vechio, Tagliu Rossu, 18–19.vi.1993, SK et LI; 1♂, Bonifacio env., San Quilico, 17.vii.2011, leg. J. Majer, coll. SK; 2♂, 1♀, Fontapone, 26–27.ix.2011, leg. V. Feik, coll. SK.

Known from scattered localities in Europe, but with no recent records from Central Europe and the Balkans (except for Romania). New species for Corsica.

Euzophera pulchella Ragonot, 1887

Material. **Croatia**, 4♂, 5♀, Omiš env., Marušići, 3–17.viii.2008, SU.

In Europe only known from the Balkans. The first occurrence in Croatia (Island of Krk) was published by Habeler (2003), but this record is not included in the current version of Fauna Europaea.

PYRALOIDEA: CRAMBIDAE

Schoenobius gigantella (Denis & Schiffermüller, 1775)

Material. **Sardinia**, 1♂, Siniscola env., Posada, 28.vi.2004, SK.

In Europe widely distributed (Slamka 2008) but previously not known from Sardinia.

***Scirpophaga praelata* (Scopoli, 1763)**

Material. **Corsica**, 2♂, Ghisonaccia env., Casamozza, 25.vii.2007, leg. A. Pavlíčko, coll. SK.

Known from most European countries, particularly from southern parts of continental Europe. New species for Corsica.

***Acentria ephemerella* (Denis & Schiffermüller, 1775)**

Material. **Corsica**, 4♂, Sant Damiano, Lido de la Marana, 16–28.ix.2011, leg. V. Feik, coll. SK.

Widely distributed, previously not recorded from Corsica.

***Euchromius bella* (Hübner, 1796)**

Material. **Slovenia**, 1♀, Kostabona env., Kapeli, 10.vii.2009, SK; 1♂, 1♀, Osp, 25.vi.2010, SK.

In Europe known mainly from southern countries, sporadically found also in Central and Eastern Europe. First country record.

***Euchromius ramburiellus* (Duponchel, 1836)**

Material. **Montenegro**, 1♂, Budva, 4.vii.1966, SK. **Greece**, 1♂, Igoumenitsa, 23.x.2003, SK.

Distributed largely in southern parts of Europe; in the Balkans previously recorded from Croatia, Romania, and Bulgaria. First country records.

***Chilo phragmitella* (Hübner, 1905)**

Material. **Greece**, 2♀, Igoumenitsa, 28.vi.2001, SK.

In Europe widely distributed but in the Balkans previously known only from the Republic of Macedonia and Croatia. First country record.

***Friedlanderia cicatricella* (Hübner, 1824)**

Material. **Greece**, 7♀, Igoumenitsa, 28.vi.2001, SK.

With a scattered distribution throughout much of Europe except for Scandinavian countries. First country record.

***Thopeutis galleriellus* (Ragonot, 1892)**

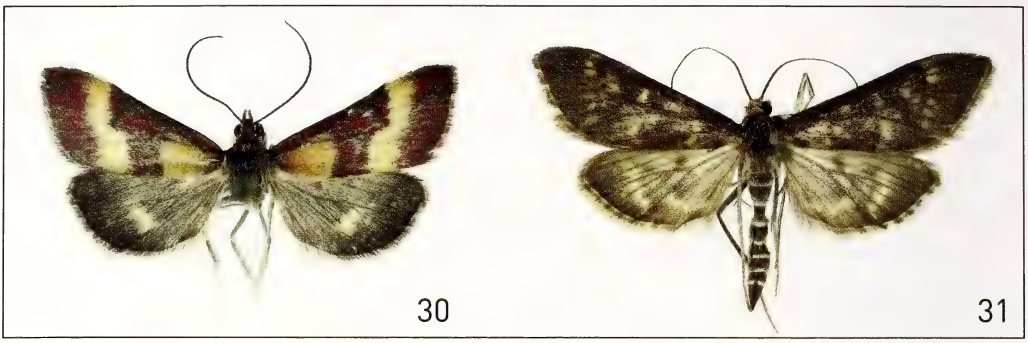
Material. **Greece**, 1♂, Igoumenitsa, 5.viii.2005, SK.

In Europe known from its southwestern and eastern part; within the Balkan Peninsula the only finding was previously published from Montenegro from 1917 (Slamka 2008). New species for Greece.

***Pyrausta tithonialis* Zeller, 1872** **Fig. 30**

Material. **Russia**, 1♂, Cheliabinsk oblast, Moskovo, 19.vi.2009, SU.

An East Palaearctic species known from Russia, China, Korea, and Japan (Shibuya 1929). In Russia previously found only in its Asian part, with most western localities in Krasnojarsk Region and Altaj Republic [= Красноярский регион, Республика Алтай]



Figs 30–31. Adults of Crambidae. **30.** *Pyrausta tithonialis* Zeller, 1872, male (Russia, 15.5 mm). **31.** *Mecyna lutulentalis* (Lederer, 1858), male (Greece, 27 mm).

(Sinev 2008). This record from the southern Urals is the first one from European Russia as well as from Europe. Genitalia of this specimen will be figured in a forthcoming edition of "Pyraloidea of Europe" (Slamka, in prep.).

Mecyna lutulentalis (Lederer, 1858) Fig. 31

Material. **Greece**, Peloponnes penin., Diakoftó, 1♂, 1♀ 19–25.vi.2001, 2♂, 1♀ 8–9.viii.2002, 1♂ 19.x.2003, 4♂ 11.vi.2008, 2♂, 4♀ 19.vi.2011; 1♂, Peloponnes penin., Chelmos, 10.viii.2002, SK; 4♂, 1♀, Smolikas Mts, Pades, 8.vii.2005, SK.

Described from an unspecified number of specimens from Damascus (Syria) (Lederer 1858), the nearest findings being reported from Turkey (Koçak & Kemal 2009). New species for Greece as well as for Europe. Genitalia of these specimens will be figured in a forthcoming edition of "Pyraloidea of Europe" (Slamka, in prep.).

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Symmoca sparsella Joannis, 1891 (Gelechioidea, Autostichidae) new to Europe

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Abstract. *Symmoca sparsella* Joannis, 1891 (Autostichidae) is reported from the Greek Island of Crete. This represents the first European record of this species. The adult, male genitalia, and the habitat in Crete, where this moth was found, are illustrated.

Introduction

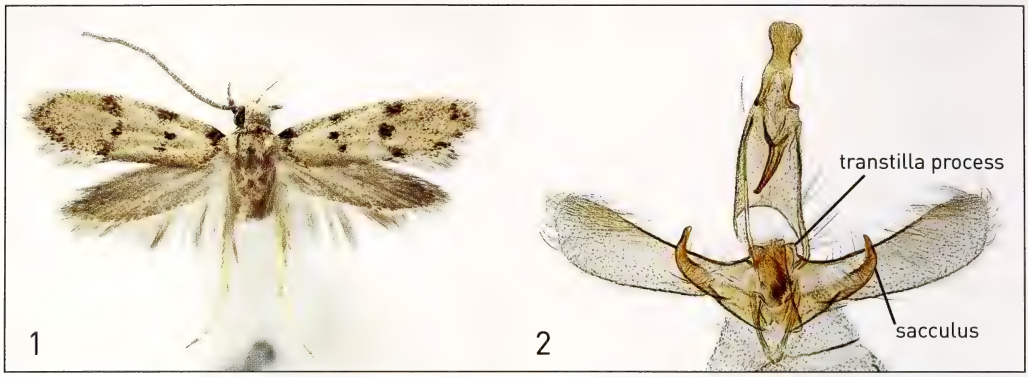
Symmocinae is the most species-rich of the five subfamilies that make up the family Autostichidae. The current concept of the family was introduced by Hodges (1998), and developed further in the phylogenetic studies by Mutanen et al. (2010) and Kaila et al. (2011). These studies have resulted in the classification applied in the recent version of the website Fauna Europaea (Vives Moreno 2011). Most of the 131 European species of Autostichidae occur in the Mediterranean area (Gozmány 2008; Vives Moreno 2011), 120 of which belong to the subfamily Symmocinae, whereas only 11 species represent the smaller subfamilies Autostichinae, Deocloninae, and Holcopogoninae (Vives Moreno 2011). Symmocinae is most diverse in the drier parts of the Palaearctic region, from the Mediterranean area to Mongolia and southern China (Gozmány 2008). The largest genus of the subfamily, *Symmoca* Hübner, (1825), contains 85 species, 34 of which have been found in Europe (Gozmány 2008; Vives Moreno 2011). The majority of Autostichidae feeds on dead plant material (Gozmány 2008; Kaila et al. 2011). The Palaearctic members of the subfamily were monographed by Gozmány (2008), who treated Symmocinae as the family Symmocidae. In the present article, *Symmoca sparsella* Joannis, 1891 is reported from Europe for the first time.

Abbreviation

NHMO Natural History Museum, University of Oslo

Symmoca sparsella Joannis, 1891 — Figs 1, 2

Material. **Greece**, Crete, Chania Province: 1♂, Hora Sfakion [UTM WGS84] 35S KU 4031 9864, 7–13.vi.2009, leg. L. Aarvik (Fig. 1). The genitalia were mounted in euparal on a glass slide numbered NHMO 2018 (Fig. 2). The specimen with the genitalia slide is deposited in NHMO.



Figs 1–2. *Symmoca sparsella* Joannis, 1891. **1.** The specimen from Crete. Wingspan 10 mm. (Photo: Karsten Sund). **2.** Male genitalia.

Fig. 3. South coast of Crete near Hora Sfakion from where the specimen of *Symmoca sparsella* was obtained. (Photo: Nini Cecilie Aarvik)

Discussion

The specimen was attracted to light. The habitat from where the moth was obtained (Fig. 3) can be characterised as garrigue, open vegetation of dwarf evergreen shrubs and herbs. The locality is situated on the south coast of Crete and is just above sea level. Dry and desert-like habitats are typical for numerous species of Symmocinae (Gozmány 2008), and in this respect the locality in Crete is also typical. *Symmoca sparsella* is known from several countries in the Middle East: Syria, Iraq, Lebanon, Israel, Jordan, and Egypt (Gozmány op. cit.).

The south coast of Crete falls into the North African climatic zone, whereas the majority of the island falls into the Mediterranean climatic zone. The south coast thus enjoys significantly more sunny days and higher temperature throughout the year (Wikipedia 2012). It can be expected that the composition of the lepidopteran fauna of the south coast is different from that of the rest of the island.

Externally, *Symmoca sparsella* resembles several other Symmocinae with dull grey-brown forewing and a pattern of dark dots arranged in four transversal rows. In the male genitalia it is easily recognisable by the presence of two rounded processes of the transtilla and a strongly curved sacculus that reaches above the dorsal edge of the valva, as well as the lack of a dorsal process of the valva. The latter structure was termed appendix by Gozmány (op. cit.), where the genitalia of both sexes are figured as well as the adult moth in colour. Based on the appearance of the male genitalia, it appears that the closest relative of *S. sparsella* is *S. huri* (Gozmány, 1963), known from Afghanistan. *S. huri* differs by having a longer saccus and shorter sacculus that does not reach the dorsal edge of the valva (compare figures by Gozmány op. cit.). Externally, *S. huri* differs strongly from *S. sparsella* by the nearly pattern-less forewing.

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Redescription of *Nephopterygia austeritella* Amsel, 1965 (Pyralidae: Phycitinae) with description of its hitherto unknown female

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Abstract. *Nephopterygia austeritella* Amsel, 1965 (type locality: Sudan, Nubian Desert, Wadi Halfa) is redescribed. The hitherto unknown female is described based on four specimens collected in the south (provinces of Hormozgan and Fars) and the southeast (province of Sistan Va Baluchestan) of Iran. The life history of the species is described for the first time and Syrian mesquite [*Prosopis farcta* (Banks & Solander) J. F. Macbride] is newly reported as its host plant. This is also the first report of this monotypic genus from Iran.

Résumé. *Nephopterygia austeritella* Amsel, 1965 (localité type: Soudan, Désert de Nubie, Wadi Halfa) est redécrite. La femelle, inconnue jusqu'à présent, est décrite d'après quatre spécimens récoltés dans les parties sud (provinces d'Hormozgan et de Fars) et sud-est (province de Sistan Va Baluchestan) de l'Iran. La biologie de l'espèce est mentionnée pour la première fois et le mesquite de Syrie [*Prosopis farcta* (Banks & Solander) J. F. Macbride] est mentionné pour la première fois comme plante hôte pour l'espèce. Ce rapport présente aussi la première mention de ce genre monotypique pour l'Iran.

Introduction

The genus *Nephopterygia* and its type species *N. austeritella* were described by Amsel (1965) based on three males collected in Sudan (Nubian Desert: Wadi Halfa), without information on life history. Later, *Nephopterygia austeritella* Amsel was reported from the Canary Islands (Fuerteventura, Jandia, Barranco Esquinzo) and Egypt (Sinai Desert: Sharm El Sheikh) (Asselbergs 2009). However, the female and life history of the species remained unknown and the genus is still monotypic.

In 2011, during a survey in Sistan Va Baluchestan province (Zabol region), signs of damage caused by pyralid larvae were detected on *Prosopis farcta* (Banks & Solander) J. F. Macbride (Fabaceae), a plant with the vernacular name of Syrian mesquite. Larvae were observed feeding in fruits and seeds, leaving tunnels through the fruit in which they pupated. After the adult moths had emerged, the males and females were compared to the known phycitine species which revealed a great similarity with male specimens of the type species of the genus *Nephopterygia*, and finally they were identified as *Nephopterygia austeritella* Amsel. Additional material was also discovered in the Hayk Mirzayans Insect Museum (HMIM) of the Iranian Research Institute of Plant Protection (IRRIP), collected in the Fars (Darab) and Hormozgan (Bandar Abbas) provinces. A redescription of the species is provided below together with a description of the female genitalia.

Material and Methods

Genitalia dissections followed Robinson (1976). Photographs were taken using a digital still camera DSC-F717 and a Dino-Eye Microscope Eye-piece camera. Some images are the result of combining multiple images using the software Combine ZP. The terminology of wing venation follows Neunzig (1986, 1990, 1997, 2003) and the remaining terminology follows Horak (1997) and Kristensen (2003). All the material examined is deposited in the HMIM collection.

Nephopterygia austeritella Amsel, 1965 — Figs 1–5

Material. **Iran**: 4♂, 4♀, Sistān Va Baluchestān Prov., Zābol, Zehak (larvae on *Prosopis farcta*), 10.vi.2011, Mansour Sārāni leg.; 1♂, 1♀, Fārs Prov., Dārāb (larvae on *P. farcta*), vi.2008, Abbas Mohammadi leg.; 1♀, Hormozgān Prov., Bandar Abbās, 16.v.1975, Hāshemi, Borumand leg.

Diagnosis. The long, slightly curved and apically sharp pointed process originating from the inner side of the valva and extending well beyond its ventral edge (Fig. 4A), combined with the presence of only one cornutus on the vesica is characteristic for the monotypic genus *Nephopterygia* Amsel.

Redescription. Wingspan 16–23 mm (male), 17–22 mm (female). Forewing length (fringe included) 7.5–10.0 mm (male), 7.5–10.5 mm (female). Head (Fig. 1): frons in female with slightly appressed, dirty cream-coloured scales, appearing nearly cone-shaped (Fig. 1A), in males not clearly cone-shaped; vertex in both sexes with dirty cream-coloured appressed scales extending beyond vertex; male vertex concave between antennal sclerites, with erect and vertically positioned scales in this area (Fig. 1D). Ocelli and chaetosemata present; patagia and tegulae dirty cream-coloured. Labial palpi sexually dimorphic: male labial palpi upcurved, 2nd segment with ventrally projecting scale tuft, 3rd segment short (1/2 of second) and bare; female labial palpi porrect, 2nd segment dorsally with slightly projecting scale tuft, 3rd segment longer than in male (2/3 of second) (Figs 1A, B). Maxillary palpi short in both male and female; proboscis normally developed and scaled basally. Antennae covered dorsally with randomly arranged cream-coloured scales; basal segments sexually dimorphic: in male with long scapus more or less vertically positioned on top of vertex, mesal edge of segments 2–7 forming basal sinus and segments 4–6 with mesal spines growing gradually from 4th to 6th segments; entire sinus covered by developed scale tuft (Fig. 1D); flagellomeres with short cilia in both sexes (1/4 of antennal segment diameter); female antennae unmodified. Abdomen dirty cream coloured. Wings (Fig. 2): Male and female similar in ground colour and pattern of both fore- and hindwings; forewings elongate-subtriangular; costa straight to 2/3 of wing length, then convex towards apex; termen oblique; ground colour varying from dirty-cream with scattered light brownish scales throughout to light greyish brown; antemedian line brownish, whitish edged on the inside, extending from 1/3 on costa to middle of dorsum; postmedian line light brownish, mostly less obvious, from costa close to apex, then slightly wavy to 5/6 on dorsum; discal spot brown; fringe dirty cream-coloured to brown; hindwings dirty cream-coloured with darker suffusion at all margins, especially at apex and costa; fringe dirty cream-coloured with a basal brown line. Wing venation (Fig. 3): Forewing with R_{3+4} and R_5 with long common

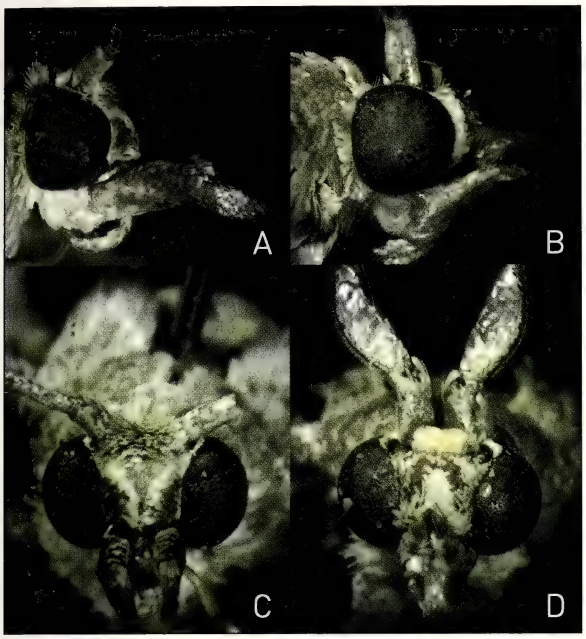

Fig. 1. Head, female (**A**) and male (**B**) in lateral view; female (**C**) and male (**D**) in frontal view.

stalk; M_2 and M_3 with short common stalk. Hindwing characteristically of quadrifid type.

Male genitalia (Figs 4A–C). Uncus a flat elongate trapezoid with dense short setae dorsally, without medial indentation at apex. Gnathos small and oval. Valva elongate, of moderate width, costa moderately sclerotised; saccular side of valva with prominent evagination; sacculus prominent and sclerotised basally; cucullus rounded. Each valva with a slightly curved and apically pointed sclerotised process originating at middle of inner side having slightly less than 1/2 length of valve (Fig. 4A). Juxta U-shaped with a pair of small flap-like processes. Vinculum almost flat basally and slightly less than the length of valvae. Transtilla paired. Phallus stout, broad and slightly shorter than valva; vesica with numerous granulations and a stout cornutus of about 2/5 of the length of phallus. Culcita with median distally bifurcated plate of variable length; ventral edge of 8th segment flatly dish-shaped with paired tapering lateral plates; two long scale bundles extending from each side of base to just beyond apex of plate.

Female genitalia (Figs 4D–H). Papillae anales subtriangular. Ostium broad, antrum sclerotised, and ductus bursae as a very well-defined, sclerotised tube. Ductus bursae relatively long, as long as corpus bursae, sclerotised and folded over itself at about 2/3. 8th abdominal segment longer than broad, posterior margin straight. Apophyses posteriores slightly longer than apophyses anteriores. Corpus bursae an inverse trapezoid, with distal wall clearly invaginated and with some irregular swellings near distal end; ductus seminalis originating from distally protruding area of corpus bursae. Signa developed as two spiny plates, one of them an elongated oval plate with inwardly directed spinules in invaginated distal wall of corpus bursae (Figs 4E, G), the other one larger, circular, with conspicuous larger spines directed inwardly (Fig. 4G).

Life history. In both Sistan Va Baluchestan (Zabol) and Fars (Darab) provinces, the females lay their eggs on the green fruits of *Prosopis farcta* in May. The eggs hatch in June, then the larvae feed on the fruit pericarps and make tunnels within the fruit (Fig. 5). They also feed on the seeds. The adults emerge in July. In all probability, *P. farcta* is the only host plant of *N. austeritella* in Iran although other food plants are not excluded. As far as we know, *Prosopis farcta* is distributed in Algeria, Egypt, Tunisia, Saudi Arabia, Palestine, Israel, Jordan, Lebanon, Syria, Cyprus, Turkey, Afghanistan,

Iran, Iraq, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, India, and Pakistan (USDA, ARS 2012). As *N. austeritella* is also known from Sudan and the Canary Islands, either the only known food plant occurs there as well, or the species is not monophagous.

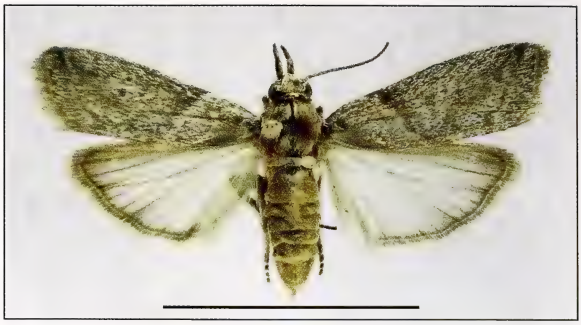

Fig. 2. *Nephopterygia austeritella* Amsel female. Scale = 10 mm.

Distribution. This species has a disjunct distribution. It is reported from the most western part of the Sahara-Arabian subregion of the Palaearctic region (Canary Islands) and its eastern parts (Egypt) (Amsel 1965; Asselbergs 2009). It is also reported from the East African subregion of the Afro-Tropical region (Sudan) (Amsel 1965), and now from Iran, which is positioned in the Turanian-Persian subregion of the Palaearctic region.

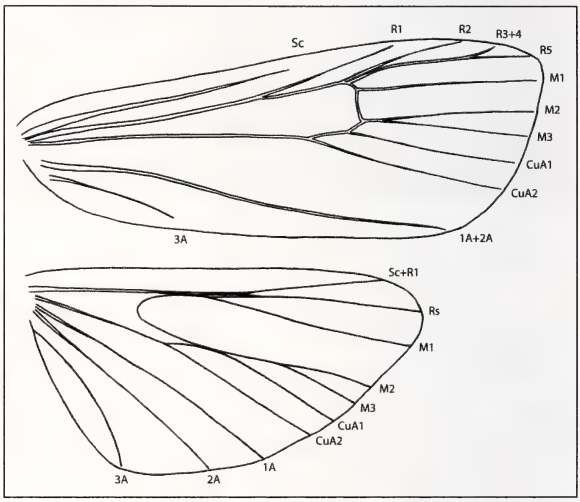

Fig. 3. Fore- and hindwing of *Nephopterygia austeritella* Amsel female.

Remarks. This is the first report of *Prosopis farcta* as a host plant for *Nephopterygia austeritella* and this phycitine taxon is newly reported from Iran. *Nephopteryx* Zeller, 1839 is an incorrect subsequent spelling and an incorrect authorship of *Nephopterix* Hübner, (1825) of which the type species is *Tinea* (= *Nephopterix*) *angustella* Hübner, 1796 (Fletcher & Nye 1984). Most of the information on species of *Sciota* has appeared in the literature under the name of *Nephopterix* Hübner (or *Nephopteryx*, an unjustified emendation). This occurred as a consequence of Heinrich (1956) and others, erroneously considering *Phycita rhenella* Zincken to be the type species of *Nephopterix* (Fletcher & Nye 1984). Palm (1986), Speidel (1996) and Leraut (1997) have moved the Palaearctic species with the features of *P. rhenella* to *Sciota*. Neunzig (2003) placed the North American species under *Sciota* as well.

Discussion

The disjunct distribution of *Nephopterygia austeritella* is not at all uncommon as can be illustrated by the following other phycitine examples: *Caina deletella* Ragonot is

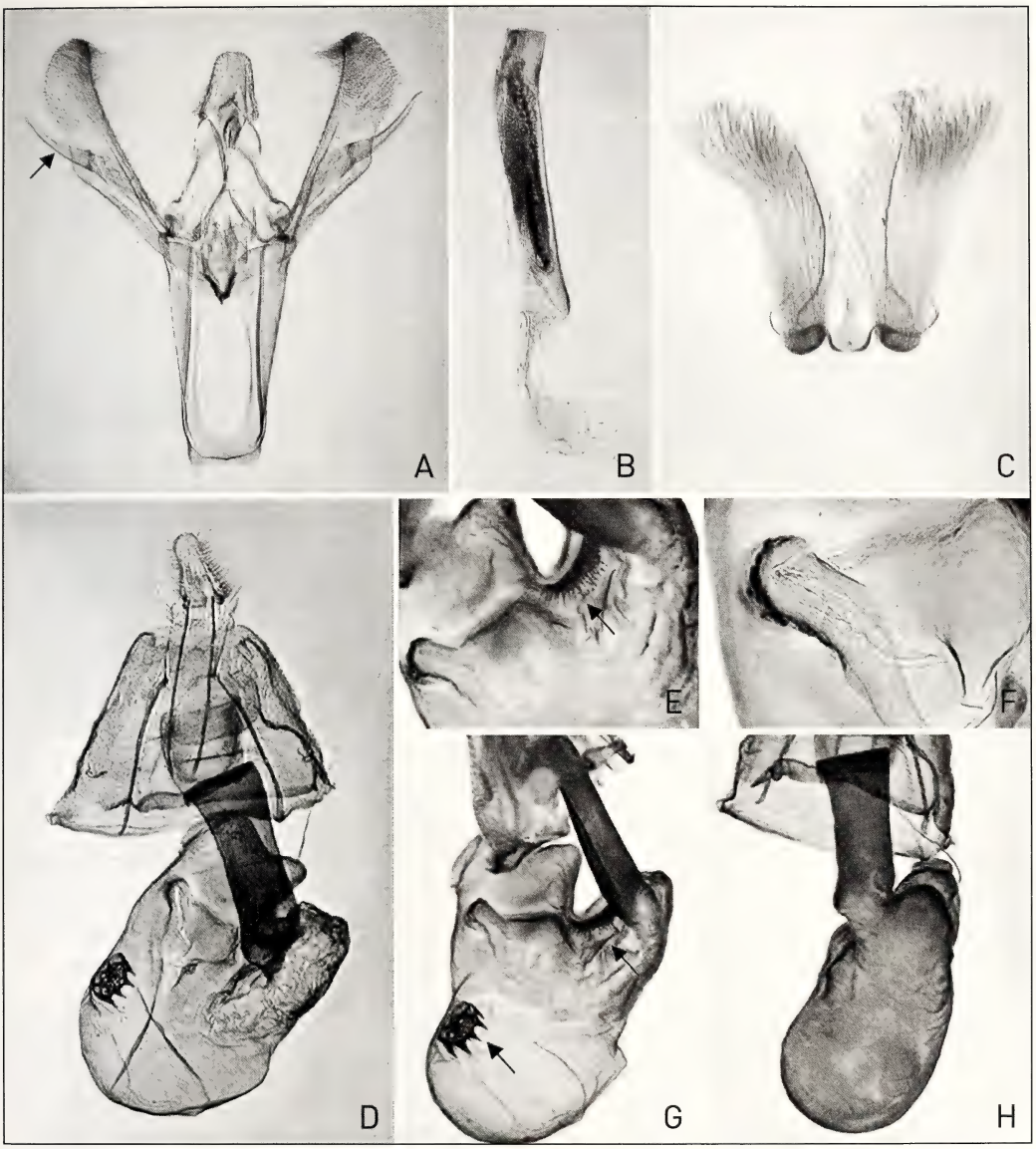

Fig. 4. Male (A–C) and female genitalia (D–H), D and H frontal and dorsal views, G lateral view.

distributed in the Canary Islands, the United Arab Emirates, South Iraq, and India; *Cherchera abatesella* Dumont is known from Tunisia, Malta, and the United Emirates; and *Pempeliella malacella* (Staudinger) is known from South Spain, Egypt, and the United Arab Emirates (Asselbergs 2007, 2010).

These disjunctions can be explained either by the insufficiently explored areas in between or by the absence of proper biotopes. *Nephopterygia austeritella* can probably be considered a southern Palaearctic faunal element which enters the northern parts of the Afro-Tropical region. This distribution seems to be similar to that of its host plant, *Prosopis farcta* (USDA, ARS 2012).

Fig. 5. *Prosopis farcta* (Banks & Solander) J. F. Macbride (A); damaged fruit (B).

Comparing the male genitalia of *N. austeritella* with those of the Old World trifine (Roesler 1973) and quadrifine Acrobasiina (part) (Roesler 1993) and with the Nearctic Phycitinae (Heinrich 1956), does not reveal many evident similarities. The same applies to the female genitalia. There is a certain similarity between the male genitalia of *Nephopterygia* and those of a few species of the Palaearctic *Sciota*, such as *marmorata* Alphéraky and, to a lesser degree, *fumella* Eversmann, because they all share a long process originating from the inner side of the valva.

While the genus *Nephopterix* Hübner, (1825) (= partly *Sciota* Hulst, 1888) seems to be related to *Nephopterygia*, it differs from the latter by the presence of two cornuti on the vesica, the differently sclerotised and unfolded ductus bursae, the lack of a signum in the bursa, and the presence of three scale tufts bilaterally on the 8th sternite. In addition, the 2nd segment of the labial palpus in the female appears to be much broader than in *Sciota*. Therefore, even including the description of the female cannot reveal a closer relationship with any of the other known genera of the subtribe Acrobasiina. At present it seems best to maintain the monotypic genus *Nephopterygia* in its rather isolated position.

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On the distribution of *Idaea gelbrechti* Hausmann, 2003 in the Ibero-Maghrebian region (Geometridae: Sterrhinae)

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Abstract. *Idaea gelbrechti* Hausmann, 2003 was described from specimens collected in Morocco, and later on it was discovered in Spain in 2010. This species is very similar to *Idaea aversata* (Linnaeus, 1758) and it might be its sister species. Also, *I. gelbrechti* seems to be one of those species that very often remain undetected or overlooked in public and private collections. New records in Southeastern Iberian Peninsula confirm its Ibero-Maghrebian distribution in habitats characterised by the presence of pine and oak forest and mountain shrubland above 1,100 m in altitude, with a meso and supramediterranean climatic biotype. This species seems to be monovoltine with records from the beginning of July in lower altitude sites through the end of August in Sierra Nevada at 1,700 m.

Introduction

Idaea gelbrechti Hausmann, 2003 was described from specimens collected in Ifrane in the Middle Atlas (Morocco), at an altitude between 1,700 and 1,750 m in an area characterized by the presence of cedar and oak mixed forest. Müller (2010) cited its presence in the Iberian Peninsula from material collected in Sierra Nevada near Puerto de la Ragua above 1,840 m in an area of mountain shrubland surrounded by pine forest.

Hausmann (2004) indicated that *Idaea aversata* (Linnaeus, 1758) can be confused with *Idaea rubraria* (Staudinger, 1901), *Idaea straminata* (Borkhausen, 1794), and *Idaea deversaria* (Herrich-Schäffer, 1847) noting that certain forms of these three species are difficult to identify without observing the hairiness of the abdomen. From the systematic point of view, *I. gelbrechti* appears to be a sister species of *I. aversata*. Moreover, this species seems to be one of those that very often remain undetected or overlooked in collections due to lack of information about North African lepidopteran fauna.

According to Müller (2010), *I. gelbrechti* and *I. aversata* can be separated by observing the color pattern and shape of the wings, as well as other specific features. The background color of the wings of *I. gelbrechti* is paler than in *I. aversata*, varying from ochre colouration in specimens of the Middle Atlas to grayer in the Sierra Nevada ones. Also, specimens of *I. gelbrechti* from the Iberian Peninsula exhibit a dark area between the medial and postmedial lines, which is often the case in *I. aversata* as well. The differences between the two species based on genital structures, as noted by Hausmann (2003) and Müller (2010), are more evident in male genital structures than in the female ones.

The aim of the present study is to extend the recorded range of distribution of *I. gelbrechti* in western Mediterranean basin with new records and to add new biological data.

Material and Methods

Male and female genitalia were prepared using the classical method as described by Fibiger (1997) with minor modifications.

Material. **Spain**, Prov. Albacete: Nerpio, Plantón del Cobacho, 30SWH52, 1,100 m, 2♂ 26.vii.2011, leg. et coll. Palacios; Riopar, Arroyo de la Celada, 30SWH55, 1,100 m, 1♂ 9.vii.2005, leg. et coll. Lencina; Nerpio, Arroyo de Santiago, 30SWH41, 1,480 m, 2♂ 30.vii.2005, 1♂ 21.vii.2007, leg. et coll. Lencina. Prov. Granada: Puebla de don Fadrique, Sierra de la Sagra, 30SWH30, 1,380 m, 1♂ 30.vii.2011, leg. et coll. Abad, 1♂ and 2♀ 2.viii.2011, leg. et coll. Palacios & Albaladejo. Prov. Murcia, Moratalla: Bajil, 30SWH83, 1,280 m, 1♂ 19.vii.2009, leg. et coll. Abad; Puerto Alto, Cañada de la Cruz, 30SWH61, 1,435 m, 2♂ 25.vii.2009, leg. et coll. Abad & Albaladejo. Prov. Almería: Bayárcal, Posada de los Arrieros, 30SVG90, 1,700 m, 1♀ 16.viii.2009, 1♂ 17.viii.2009, 1♂ 23.viii.2009, leg. J. Gelbrecht, T. Drechsel, E. Schwabe & D. Stadie, coll. Gelbrecht.

Results

After Müller (2010) recorded *Idaea gelbrechti* in Spain, the specimens in private and public collections were checked paying special attention to those identified as *Idaea aversata* from southern Iberian Peninsula. *I. aversata* was recorded in southeastern Iberian Peninsula from Albacete (Lencina et al. 2009), Alicante and Castellón (Domínguez in litt. 1991), Cuenca (Ortiz et al. 2009, 2010b) and Murcia (Ortiz et al. 2010a). Specimens of *I. aversata* from this Iberian area were found in private collections of C. Abad, A. Albaladejo, F. Lencina, and J. L. Palacios, but not in collections from Museo Nacional of Ciencias Naturales in Madrid, Department of Zoology and Physical Antrophology from Murcia University, or in other private collections. The locations of new records are shown in Fig. 1.

Habitat preferences of *I. gelbrechti* are diverse but always located above 1,100 m in altitude. The mean altitude of the recording sites is 1,400 m. The original locality for description in Morocco is an area characterized by the presence of cedar and oak mixed forest (Hausmann 2003). In the Iberian Peninsula all records are located in the Baetic Mountains. The first record was cited from Sierra Nevada where the habitat is characterized by mountain shrubland with *Juniperus sabina* L. and *Juniperus communis hemisphaerica* (C. Presl) Nyman surrounded by *Pinus sylvestris* L. New records from Subbaetic Mountains are located in areas with mixed forest of *Pinus pinaster* Ait., *P. nigra mauretanica* Maire & Peyerimh, *Quercus rotundifolia* Lam., *Q. faginea* Lam., and *Acer opalus granatense* (Boiss.), and riparian forest (*Populus* spp. and *Salix* spp.) with shrubland (*Genista* spp., *Berberis* spp., *Cytisus* spp., *Lavandula* spp., *Prunus* spp., etc); in Bajil there is an oak forest of *Quercus rotundifolia* Lam. with typical undergrowth (*Arbutus unedo* L., *Phillyre angustifolia* L., *Pistacea* spp., *Lonicera* spp., etc). In all cases no grasses or cultivated land were found in the vicinity. This Subbaetic Mountainous region is characterized by meso and supramediterranean climatic biotype.

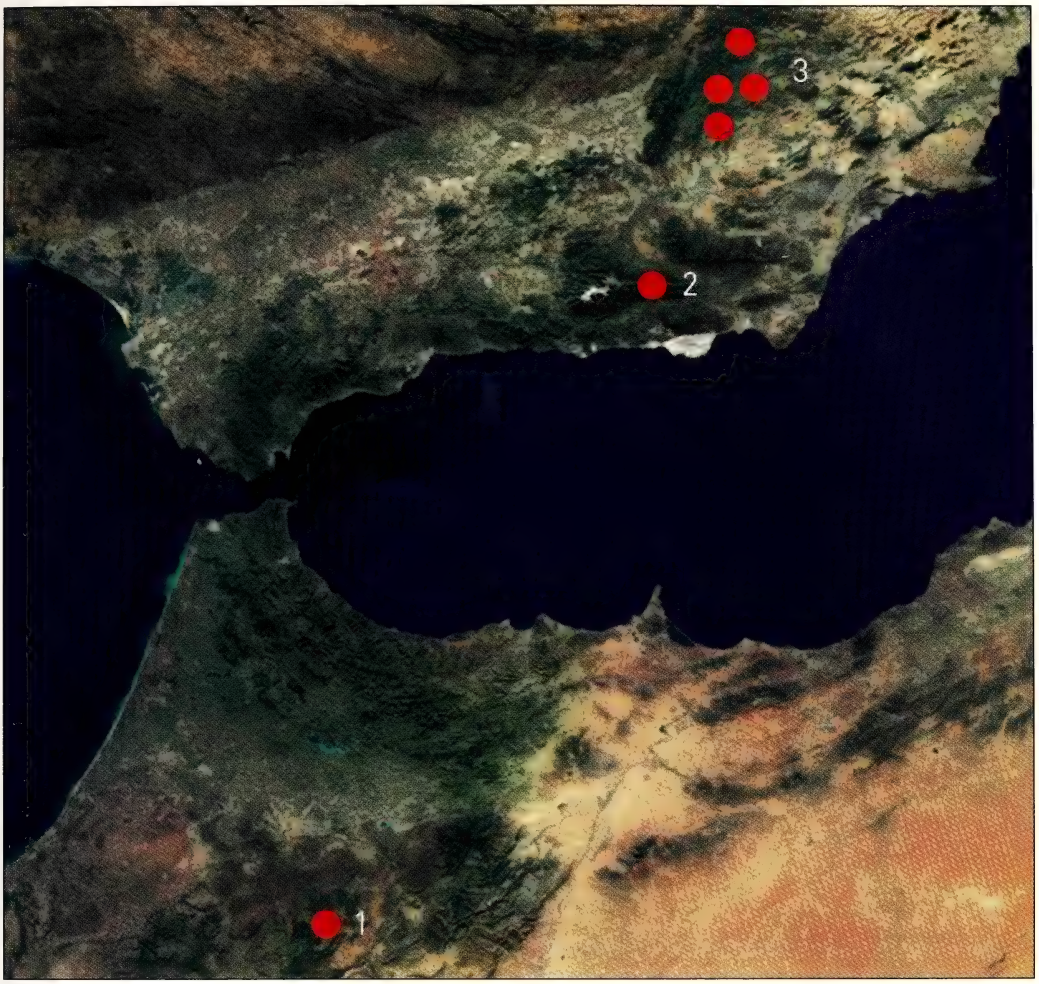

Fig. 1. Map of distribution of *Idaea gelbrechti* in the Western Mediterranean Basin; **1**. Type localitiy; **2**. First record in Iberian Peninsula; **3**. New records. Map source: The Earth Observatory located at NASA Goddard Space Flight Center.

I. gelbrechti seems to be a monovoltine species with records from the beginning of July in lower altitude sites (1,100 to 1,480 m) to the end of August in Sierra Nevada at 1,700 m, without records at the Sierra Nevada site from March to the beginning of July and from September to November (J. Gelbrecht, pers. comm.).

Discussion

The presence of new records of *Idaea gelbrechti* in the Baetic Mountain System confirms that this species has an Ibero-Maghrebian distribution as suggested by Müller (2010).

Interestingly, *I. gelbrechti* has not been recorded in other mountainous areas of the southern Iberian Peninsula, for example, the ones located in Murcia (Sierra Espuña:

Calle et al. 2007; Sierra Pila and Sierra Carrascoy: unpublished data) and Almería (Sierra de María: unpublished data), where intensive sampling has been carried out for a long time. This absence may be due to a more thermophilus regime of these last-mentioned regions – *I. gelbrechti* seems to prefer colder biotopes and is thus found in other mountains of southern Iberian Peninsula such as Sierra Baza, Sierra de Filabres, and Sierra de Ronda, and possibly also in Rif and Tellian Mountains, where similar climatic conditions are met.

In relation to morphological characters, Müller (2010) notes that specimens of *I. gelbrechti* from the Iberian Peninsula exhibit a dark area between the medial and post-medial lines, although Gelbrecht (pers. comm.) bred 42 specimens of *I. gelbrechti* from the locality of the first Iberian record from a single female and the result was 33 specimens with this dark area between the medial and postmedial lines, whereas nine specimens did not exhibit this character. This finding reinforces the necessity of using the genital structures to differentiate specimens of *I. gelbrechti* as Hausmann (2003) and Müller (2010) suggested.

Acknowledgements

Thanks are due to Carmelo Abad, Aquilino Albaladejo, Francisco Lencina, José Luis Palacios, Manuel Garre, and Francisco Javier Pérez López for allowing access to their collections, and to Mercedes Paris for data from the Entomology collections of Museo Nacional de Ciencias Naturales in Madrid. We also thank our colleagues Dr. José A. de la Calle, Dr. Axel Hausmann, and Dr. José Serrano for their comments and suggestions with specials thanks to Dr. Jörg Gelbrecht for the last records, life cycle contributions, and other comments. At the end, our colleague John Girdley provided linguistic help.

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Eupithecia Curtis, 1825 of Afghanistan (Geometridae: Larentiinae)

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Abstract. In this paper 49 species of the genus *Eupithecia* Curtis, 1825 (Lepidoptera, Geometridae) are recorded for the fauna of Afghanistan. The type specimens of the majority of these species were studied. In case of *Eupithecia ochrovittata* Christoph, 1887 it was necessary to designate a lectotype. The following three new species are described: *Eupithecia tabestana* **sp. n.**, *Eupithecia fredi* **sp. n.** and *Eupithecia naumanni* **sp. n.** Five taxa are synonymised: *Eupithecia linariatoides* Mironov, 1989 **syn. n.** is a synonym of *Eupithecia mirificata* Brandt, 1938; *Eupithecia denotata* f. *difficilis* Dietze, 1911 **syn. n.**, synonym of *Eupithecia nigrilinea* (Warren, 1896); *Eupithecia eberti* Vojnits, 1978 **syn. n.**, synonym of *Eupithecia obtinens* Brandt, 1941; *Eupithecia subomnigera* Vojnits, 1988 **syn. n.**, synonym of *Eupithecia tshimganica* Viidalepp, 1988; *Eupithecia procera* Vojnits, 1982 **syn. n.**, synonym of *Eupithecia exactata* Staudinger, 1882. A total of 42 species are recorded as new for the fauna of Afghanistan.

Zusammenfassung. In dieser Arbeit werden insgesamt 49 Arten der Gattung *Eupithecia* Curtis, 1825 (Lepidoptera, Geometridae) für die Fauna von Afghanistan belegt. Für die überwiegende Zahl der Arten konnten die Typen untersucht werden. Für *Eupithecia ochrovittata* Christoph, 1887 wurde ein Lectotypus designiert. Drei Arten werden neu beschrieben: *Eupithecia tabestana* **sp. n.**, *Eupithecia fredi* **sp. n.** und *Eupithecia naumanni* **sp. n.** Fünf Taxa werden synonymisiert: *Eupithecia linariatoides* Mironov, 1989 **syn. n.** ist ein Synonym von *Eupithecia mirificata* Brandt, 1938; *Eupithecia denotata* f. *difficilis* Dietze, 1911 **syn. n.**, Synonym von *Eupithecia nigrilinea* (Warren, 1896); *Eupithecia eberti* Vojnits, 1978 **syn. n.**, Synonym von *Eupithecia obtinens* Brandt, 1941; *Eupithecia subomnigera* Vojnits, 1988 **syn. n.**, Synonym von *Eupithecia tshimganica* Viidalepp, 1988; *Eupithecia procera* Vojnits, 1982 **syn. n.**, Synonym von *Eupithecia exactata* Staudinger, 1882. Insgesamt werden 42 Arten als neu für die Fauna von Afghanistan dokumentiert.

Introduction

The genus *Eupithecia* includes nearly 1400 known species distributed worldwide. It is one of the most species-rich genera of the family Geometridae but has hardly been studied in Afghanistan until now. Only two representatives of the genus have been described from this large Asian country by Vojnits (1988): *E. convallata terricolor* Vojnits, 1988 and *E. xanthomixta* Vojnits, 1988, and two species, *E. egregiata* Mironov & Ratzel, 2008 and *E. nigrilinea* Warren, 1896, have recently been mentioned for Afghanistan (Mironov et al. 2008c). However, *Eupithecia* of the adjacent territories has been investigated fairly well, e.g., Turkmenistan, Uzbekistan, and Tajikistan (Staudinger 1892; Dietze 1904, 1908; Viidalepp 1988, 1996; Mironov 1990, 1991), Iran (Bytinski-Salz & Brandt 1937; Brandt 1938, 1941; Schwingenschuss 1939; Vojnits 1978, 1982a, 1982b, 1988), northern Pakistan and Kashmir (Mironov et al. 2008a, 2008b, 2008c). For this

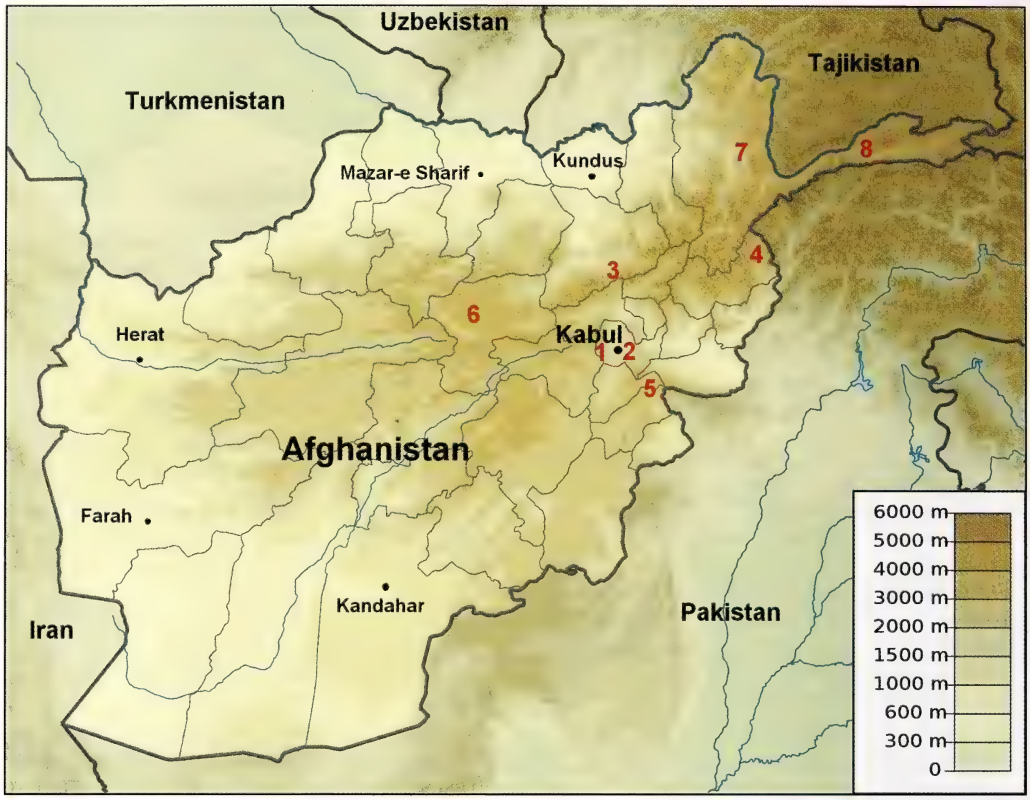


Fig. 1. Map of Afghanistan with the main localities of the material from the SMNK (for details see text): **1**. E Afghanistan (Paghman); **2**. E Afghanistan (Kabulschlucht, Khurd Kabul, Sarobi, Pol-i-Charchi); **3**. E Afghanistan (Salang-Pass, Salang); **4**. E Afghanistan, (Kunar, Nuristan, Barg e Matal, Kamu); **5**. SE Afghanistan (Paktia, Safed Koh, Kotkai); **6**. Z-Afghanistan, Koh-i-Baba (Band-i-Amir, Panjao); **7**. NE Afghanistan, Prov. Badakshan (Baharak, Pejui, Sarekanda); **8**. NE Afghanistan, Wakhan-Valley (Langar, Zemestani Baharak, Kotal-e-Dalez, Darrah-e-Shaur, Sargaz, Sarhad); Source of map: Urutsek – Wikipedia.

area about 170 species of *Eupithecia* have been recorded. In Europe, for comparison, there are 128 species (Mironov 2003).

The first time a few specimens from Afghanistan were collected in 1941 and 1942 by Fred Brandt, whose material is now deposited in the collection of his brother Wilhelm Brandt in NHRS (Stockholm). The greater part of Afghanistan *Eupithecia* was collected later by †H. G. Amsel (SMNK), G. Ebert, M. Müller (SMNK), †C. Naumann (ZFMK), †F. Kasy (NHMW) and †A. & E. Vartian (Vienna) from 1956 to 1972. The majority of this material has remained undetermined.

The main component of the material we used for this paper comes from the large collection of Irano-Afghanian Lepidoptera of the Museum of Natural History Karlsruhe (SMNK). Unfortunately, it is still unclear where the material collected by H. G. Amsel during the "Deutsche Afghanistan Expedition" in 1956 is deposited. After this manuscript was already in review, in March 2012 we found undetermined material of *Eupithecia* from Afghanistan in the large collection of the ZSM, collected by G. Ebert in 1961 and K. Omoto in 1963. From this material we included the important species;

however, 50 of about 130 of these specimens belong to the *innotata*-species group, and because of their worn condition we decided to exclude them from this study.

Nearly all localities of collected *Eupithecia* in Afghanistan mentioned in this work are illustrated on a map (Fig. 1). This map only provides an overview and not the exact positions of the localities.

Methods

This paper is essentially a faunistic list and constitutes a revision of the species of *Eupithecia* found in Afghanistan. We have been able to locate and examine almost all of the original type material used by K. Dietze, O. Staudinger, O. Bohatsch (MNHU, Berlin), G. F. Hampson, W. Warren, E. P. Wiltshire, H. Inoue (BMNH, London), S. Alphéraky, H. Christoph (ZISP, Saint Petersburg), W. Petersen (IAET, Tartu; MNHU, Berlin), W. Brandt (NHRS, Stockholm), E. Schütze (ZSM, Munich; SMNS, Stuttgart), R. Pinker (NHMW, Vienna), A. M. Vojnits (HNHM, Budapest; MNHU, Berlin; ZFMK, Bonn; SMNK, Karlsruhe; ZISP, Saint Petersburg) and J. Viidalepp (IAET, Tartu; ZISP, Saint Petersburg). Likewise, we examined the types of 73 species-level taxa from the 87 (84%) that are mentioned in this paper. Most of the types that we did not examine are early-described species with lost (syn)types such as, for example, *E. venosata* (Fabricius, 1787), *E. simpliciata* (Haworth, 1809), *E. subnotata* (Hübner, 1813), *E. centaureata* (Denis & Schiffermüller, 1775).

Space prevents the inclusion of genitalia figures for all species treated, but we have aimed in this paper to illustrate not only the new species described, but also other species which have not been figured in recent publications. The sequence of species in this work follows the groups into which the genus *Eupithecia* is divided by different authors (e.g., Mironov 2003).

Abbreviations

BMNH	The Natural History Museum, London, United Kingdom
IAET	Institute of Agriculture and Environment, Estonian Agricultural University, Tartu, Estonia
IZCAS	Institute of Zoology, Chinese Academy of Sciences, Beijing, China
MNHU	Museum für Naturkunde, Berlin, Germany
NHMW	Naturhistorisches Museum Wien, Austria
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
SMNK	Staatliches Museum für Naturkunde Karlsruhe, Germany
HNHM	Hungarian Natural History Museum, Budapest, Hungary
ZFMK	Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany
ZISP	Zoological Institute, Russian Academy of Sciences, Saint-Petersburg, Russia
ZMMU	Zoological Museum, Moscow State University, Russia
ZSM	Zoologische Staatssammlung München, Germany

Systematics

Eupithecia olgae Mironov, 1986

Eupithecia olgae Mironov, 1986: Trudy Vsesojuznogo Entomologicheskogo Obshchestva **67**: 96, figs 2a, b. Holotype ♀ (ZISP), Kyrgyzstan: Inner Tian-Shan, Naryn, 2030 m.

Material. Holotype ♀, **Kyrgyzstan**, Inner Tien-Shan Mts., Naryn, at light, 2030 m, 25.vii.1983, leg. V. Mironov (ZISP). – Paratypes: 2♀, **Kyrgyzstan**, environs of Przhevalsk, at light, 1600–1650 m, 6., 22.vi.1982, leg. N. Tristan. 1♀, **Kazakhstan**, Aksu-Dzhabagly Nature Reserve, Dzhabagly village, 1300 m, 25.vii.1975, leg. E. Ishkov (ZISP). NE Af**ghanistan**: 1♂, Wakhan-Tal, 3400 m, Kotal-e-Dalez, W-Seite, 28.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 271 (SMNK).

Afghanistan is a new country for the distribution area of this Central Asian species. It has been known from Uzbekistan, Kyrgyzstan, Tajikistan, Pakistan, and India (Jammu & Kashmir), southeastern regions of Kazakhstan, China (Tibet, Qinghai, Gansu, Shanxi), and Mongolia. This species is mentioned here as first because it belongs to the *haworthiata* species-group with plate-like, membranous uncus in the male genitalia.

Eupithecia dalhousiensis Mironov & Galsworthy, 2008

Eupithecia dalhousiensis Mironov & Galsworthy, 2008: Transactions of the Lepidopterological Society of Japan **59** (1): 65, figs 7, 21, 22. Holotype ♀ (BMNH), [India]: Dalhousie.

Material. Holotype ♀, **India**, Dalhousie N.W. Amalnym, Moore Coll. 94–106, *Phibalapteryx interrubrescens* ab. *dalhousiensis* Strand, type ♀, BM Geom. slide no. 2944 (BMNH, originally syntype of *E. interrubrescens*). – Paratypes: 1♀, **India**, Simla, 7,000 ft., A. E. Jones BM 1931–101; 1♂, Goorais Valley, June 1887 J. H. Leech, BM Geom. slide no. 2940; 1♂, Murree, 19.v.1976; 1♀, Snogran, 14.v.1970, M. Anwar, BM Geom. slide no. 7705; 1♀, Murree, 17.v.1976; 1♂, Snogran, 15.v.1970, M. Anwar; 1♂, Dungagali, 18.v.1970, BM Geom. slide no. 7704 (BMNH). SE **Afghanistan**: 2♀, Safed Koh, S-Seite, Kotkai, 2350 m, 24–25.vii.1967, M. Müller leg., Ratzel slide no. GU211011/1w (SMNK).

A very large species (wingspan 24–37 mm) from the *Eupithecia abietaria* group (Inoue 1979), which is similar to two other allied Asian species: *E. gigantea* Staudinger, 1897 and *E. interrubrescens* (Hampson, 1902). This species was described and has hitherto been known from Western Himalayas (northern Pakistan and northern India). It was not previously recorded from Afghanistan.

Remarks. *E. dalhousiensis* was described in 1919 by Strand as "ab." (aberration) of *interrubrescens* Hampson. Later it was recognized as a separate species (Mironov et al. 2008a).

Eupithecia mirificata Brandt, 1938

Eupithecia mirificata Brandt, 1938: Entomologische Rundchau **55** (50): 587, pl. 3, figs 291–293. Holotype ♀ (NHRS), [Iran]: Comèe.

Eupithecia linariatoides Mironov, 1989 **syn. n.**: Vestnik Zoologii **1989** (3): 13, figs 2a–d. Holotype ♂ (ZISP), Tadjikistan: Khorog, Botanical Garden, 2340 m.

Material. Holotype ♀, **Iran**, Fars, Strasse Ardekan-Talochosroe, Comèe, ca 2600 m, 22.vii.1937, coll. Brandt, 78/57, coll. RMS, Holotype *Eupithecia mirificata* Brdt. Brandt, 10, photo 18 F 80 det. A. Vojnits (NHRS). – Paratype: 1♂, same locality, 16.viii.1937, coll. Brandt, coll. RMS, Allotype *Eupithecia mirificata* Brdt. Brandt, photo 19 F 80 det. A. Vojnits (NHRS). – Holotype of *E. linariatoides* ♂, **Tajikistan**, Pamir, Horog, Hortus Botan., 2340 m, 17.vi.1963, M.L. Zaprjagaew, ex coll. Zool. Inst. Acad. Sci. St. Petersburg, Russia (ZISP). – Paratypes of *E. linariatoides*: 2♂, 2♀, same locality, 2340 m, 20, 21.vii.1960, 4.vi.1961, M. Zaprjagaew; 3♂, 2♀, same locality, 2300 m, 19.vii, 2, 4.viii.1966, 1.vi.1970, 8.vii.1971,

M. Zaprjagaew; 1♀, Pamir mer. occ., fl. Gunt, 2700 m, 29.vii.1962, Bundel (ZISP). **Afghanistan**: 1♂, Pandshir Tal, Unteres Parian, 2500 m, 30.vii.1961, leg. G. Ebert (ZSM); 6 exx., Paghman, 30 km NW v. Kabul, 2100–2500 m, 20–22.v.1963, Kasy & Vartian; 1 ex., Prov. Kadaghan, Salang Paß, Nordseite, 69°L 35°40'B, 11–12.vii.1971, leg. Vartian (HNHM); NE Afghanistan, 2♂, Prov. Badakhshan, 1750 m, 12 km NE of Baharak, Pejuj, 27.vi.1971, UV-Li, leg. Ebert & Naumann, coll. Nr. 224; 1♂, Prov. Badakhshan, 3000 m, 15 km NE of Baharak, Kotal-e-Zardeu, 30.vi.1971, UV-Li, Ebert & Naumann, coll. Nr. 230 (SMNK).

In our opinion *E. mirificata,* described from Iran and *E. linariatoides* from Tajikistan are conspecific. The male and female genitalia were illustrated in Mironov (1989b) as *E. linariatoides*.

Remarks. Neither the holotype nor paratype (allotype) of this species (*E. mirificata*) have an abdomen or labels with information about genitalia slides. However, there is a series of this species from Afganistan in current material. *Eupithecia mirificata* appears to be closely related to *E. linariata*, and therefore further investigation of the biology of the early stages and DNA barcoding should be done in the future to clarify the status of this species.

Eupithecia minusculata Alphéraky, 1883

Eup[*ithecia*] *minusculata* Alphéraky, 1883: Horae Societatis entomologicae Rossicae (1882) **17** (3/4): 225, pl. 9, fig. 91. Holotype ♀ (ZISP), [China]: Kouldjà.

Eupithecia penultimaria Wiltshire, 1985: The Entomologist's Gazette **36** (4): 265, pl. 9, figs 2, 3, 5: a–c, 6. Holotype ♂ (BMNH), Iraq: Baghdad, on a Tigris island (synonymised in Scoble et al. 1999).

Material. Holotype ♀, **China**, Guldscha, 1.v.1879, Alph., *minusculata*, Origin. (ZISP). – Holotype of *E. penultimaria* ♂, **Iraq**, Baghdad, at light on a Tigris island, amongst tamarisks, 10.v.1937 (E.P.W.), BM Geom. slide no. 2386 (BMNH). – Paratypes of *E. penultimaria*: 2♀, same data, BM Geom. slide no. 2416; 1♀, same data but 3.vi.1937; 1♀, Baghdad, west bank of Tigris, 14.v.1954 (E.P.W.), BM Geom. slide no. 2417 (BMNH). E **Afghanistan**: 1♂, 1♀, Nurisan-Bashgal, vic. Barg-e-Matal, 2200 m, 3., 5.vii.1970, Nr. 11, leg. C. Naumann, E-lep 209, Ratzel slides nos GU24408/1w, GU24408/2m (SMNK).

A widespread desert or xerophilous species, ranging from Spain in the west through North Africa (Algeria, Tunisia, Libya) and Mid-East eastward to Mongolia; north to the lower part of the River Volga. It is distributed in Central Asia in Turkmenistan, Uzbekistan, Tajikistan, Afghanistan, southern Kazakhstan, and northwestern China (Xinjiang). Not previously recorded from Afghanistan. The male and female genitalia were described and illustrated by Wiltshire (1985) for the first time as *E. penultimaria*.

Eupithecia venosata (Fabricius, 1787)

Phalaena venosata Fabricius, 1787: Mantissa Insectorum **2**: 209. Syntype(s) lost, Austria.

Eupithecia comparanda Vojnits, 1981: Annales Historico-Naturales Musei Nationalis Hungarici **73**: 221, figs 1, 2. Holotype ♂ (SMNK), Pakistan (west): Swat, Kalam Gabral-Tal, 2100 m (synonymised in Mironov et al. 2008b).

Material. Holotype of *E. comparanda* ♂, W **Pakistan**, Swat, Nv. Kalam, Gabral-Tal, 2100 m, 9.vii.1969, leg. G. Ebert, Vojnits slide no. 12093♂ (SMNK). – Paratypes of *E. comparanda*: 3♂, 3♀, W **Pakistan**, Swat, Kalam, 2000 m, 9.vii.1969, leg. G. Ebert, Vojnits slides nos 12094♂, 12095♂, 12096♂, 12099♀, 12100♀, 12102♀ (SMNK); 1♂, 1♀, same data, Vojnits slides nos 12097♂, 12098♀ (HNHM). W **Afghanistan**: 3♂, 1♀, Nurisan-Bashgal, vic. Barg-e-Matal, 2200 m, 3 and 5.vii.1970, Nr. 11, leg. C. Naumann E-lep 209, prep. U. Ratzel 2008, Ratzel slides nos GU3408/1m, GU3408/3w; 1♂, E Afghanistan, Nuristan-Bashgal, vic. Barg-e-Matal, 3 km W (Seitental), 2500 m, 6.vii.1970, leg. C. Naumann, Nr. 1106, Ratzel slide no. GU3408/2m (SMNK).

A western Palaearctic species ranging from Portugal and Morocco in the west to the Baikal Lake in Siberia in the east. A new species for the fauna of Afghanistan. The details of the male and female genitalia were described and illustrated in Petersen (1910) for the first time and after that in many other publications of European authors, as well as in Vojnits (1981) for the *E. comparanda* from Pakistan.

Eupithecia hilariata Dietze, 1908

Eupithecia hilariata Dietze, 1908: Deutsche entomologische Zeitschrift, Iris **21** (3): 180. Syntypes 2♂, 1♀ [*nec* 1♂, 2♀] (coll. K. Dietze and R. Püngeler in MNHU), [Tajikistan]: [Ispajran]; [China]: [Juldus-Gebirge], [Ili Gebiet].

Material. Syntypes: 1♂, **Tajikistan**, Ispajran, Alai sept., 3400 m, August, 124., *hilariata* Dietze, Jspajran Alai sept., Orig., ♂, Typus, Vojnits slide no. 1178♂. 1♂, **China**, *hilariata*, Juldus, Ili, Zool. Mus. Berlin, *hilariata* Dtze., präp. Nr. A 835♂, det. E. Schütze, Kassel; 1♀, *hilariata*, Palpen lang, Juldus., Ili, Zool. Mus. Berlin, *Eupithecia hilariata* ♀, Juldus Ili, prep. № 1657.2 E. De Laever det. 1957 (coll. K. Dietze in MNHU). 1♂, Asia centr., **Kyrgyzstan**, Togus-torau, Rückbeil 1901, ? *Schiefereri* var. ♂ (*hilariata*), v. R. Tancré, 2.02, *hilariata*, Sehr nache *schiefereri*; palpen spitzer u. länger (Dtze.), *Eupithecia hilariata* ♂, Type, Prep. № 1657.1 E. De Laever det. 1957 (coll. R. Püngeler in MNHU). **Afghanistan**: 1♂, Pagman-Gebirge (Kabul), ca. 3000 m, Juni–Juli 1942, coll. Brandt, 8, Paratypus *Eupithecia frediata* Schüt. (undescribed) ♂, E. Schütze, Kassel, photo 16 F 80 det. A. Vojnits (NHRS); 1♀, Paghman, 30 km NW v. Kabul, 20–22.vii.1963, 2200 m, Kasy & Vartian, Ratzel slide no. GU12609/1w; 2♂, 1♀, same locality, but 2500 m, 3., 5., 12., 15.vi.1965, Kasy & Vartian, Ratzel slides nos GU2609/3m, GU31209/1m, GU12609/2w (NHMW).

A new species for the fauna of Afghanistan. Its range is in Turkmenistan (Kugitang Mts.), Uzbekistan (Karzhan Tau Mts., Chimgan Mt.), Tajikistan (Pamirs Mts.), Kyrgyzstan (Tien-Shan Mts.), mountains of southern and southeastern Kazakhstan, and the northwestern province of China (Xinjiang). The male and female genitalia were described and illustrated by De Laever (1960) and Schütze (1960) for the first time.

Eupithecia nigrilinea (Warren, 1896)

Tephroclystia nigrilinea Warren, 1896: Novitates Zoologicae. **3**: 317. Holotype ♀ (BMNH), [India]: Kasauli.

Eupithecia ?denotata f. *difficilis* Dietze, 1911 **syn. n.**: Biologie der Eupithecien **1**: pl. 85, figs 905–907; ibidem (1913), **2**: 92. Holotype ♀ (designated by Vojnits; coll. K. Dietze in MNHU), [Tajikistan]: Ispajran [=Isfara], 3400 m.

Eupithecia ingrata Vojnits, 1981: Annales Historico-Naturales Musei Nationalis Hungarici **73**: 224, fig. 4. Holotype ♀ (SMNK), Pakistan (west): Swat, N of Kalan Gabral-Tal, 2100 m (synonymised in Mironov et al. 2008c).

Eupithecia ingrata talvei Viidalepp, 1988: Fauna pyadenits gor Srednej Azii [Geometridae fauna of the Central Asian mountains]: 121, pl. 2, fig. 18; text-pl. 26, figs 5–10. Holotype ♂ (IAET), Tadzh. SSR [Tajikistan]: Gissarsky Mts, southern slope, River Khonaka, Shamol.

Material. Holotype ♀, **India**, Kasauli aug. 1893, *nigrilinea* Warr. Type ♀ (BMNH). – Holotype of *E. denotata difficilis* ♀, **Tajikistan**, Ispajran, Alai sept., 3400 m. August, *difficilis* Typ. Alai sept., Holotypus *Eupithecia difficilis* Dietze [design. by Vojnits], Vojnits slide no. 10240 ♀ (coll. K. Dietze in MNHU). – Paratype of *E. denotata difficilis*: 1♂, **Tajikistan**, Ispajran, Alai sept., 3400 m. August, *difficilis* Type., Alai sept. (coll. K. Dietze in MNHU). – Holotype of *E. ingrata*, ♀, **Pakistan**, Swat, N v. Kalam, Gabral-Tal, 2100 m, 6–9.vii.1969, leg. G. Ebert, Vojnits slide no. 12092♀ (SMNK). – Holotype of *E. ingrata talvei*, ♂, **Tajikistan**, Ghissarsky Mts., southern slope, Khonaka r[iver], Shamol, 7.vi.1976, leg. Talve (IAET). – Paratype of *E. ingrata talvei*: 1♂, **Kyrgyzstan**, Mts. Tschatkalensis merid., lacus Sary-Tschilek, 1900 m, 13.vii.1964, Bundel (ZISP). **Afghanistan**: 1♂, Pagman-Gebirge (Kabul), ca. 3000 m, vi–vii 1942, coll. Brandt, R. M. Prep. 4898, 7473 E94+, *Eup. centripunctata* Schü., Präp. Nr. S 1211♂, det. E. Schütze, Kassel, Monotypus *Eup. centripunctata* Schü. (undescribed), E Schütze, Kassel, Naturhistoriska

Riksmuseet, Loan no 366/06 (NHRS); 1♀, NE Afghanistan, Gebirge Badakschan, Sarekanda, 2800 m, 21.vii.1953, J. Klapperich, Ratzel slide no. GU24911/2w (SMNK); 1♂, E Afghanistan, Sarobi, 1100 m, 17.x.1961, leg. G. Ebert, Ratzel slide no. GU13312/3w; 1♂, Hazaradjat, Koh-i-Baba, Pandjao Umgeb., 2500 m, 26.vi–1.vii.1961, leg. G. Ebert, Ratzel slide no. GU13312/4m (ZSM); 15♂, 2♀, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 14–23.vi.1966, 21.vi–1.vii.1969, G. Ebert leg., Vojnits slides nos 16959♂, 16960♂, 16961♂, 16962♂, 16966♂, 17545♂, 17548♂, 17549♂, 17550♂, 19502♂, 19540♂, 19542♂, 19543♂, 19544♂, 19545♂; 16963♀, 16965♀; 4♂, 3♀, same locality, 20–25.vi, 4.vii, viii, 1967, 5., 28.vi, 2.vii.1968, M. Müller leg., Vojnits slides nos 16955♂, 16979♂, 17564♂, 17566♂, 16975♀, 16976♀, 19546♀; 1♂, Prov. Paktia, same locality, 16–17.vi.1971, UV-Li, Ebert & Naumann; 1♂, 2♀, E Afghanistan, Salang-Pass, N-Seite (Khinjan), 2100 m, 5–11.vii.1966, G. Ebert leg., Vojnits slides nos 19536♂, 17872♀, 19495♀; 1♂, 4♀, C Afghanistan, Koh-i-Baba, S-Seite, Panjao, 2650 m, 20–22. vii.1966, G. Ebert leg., Vojnits slides nos 17779♂, 17780♀, 19490♀, 19511♀, 19519♀ (SMNK); 1♂, 4♀, C Afghanistan, Koh-i-Baba, N-Seite, Band-i-Amir, 2900 m, 24–26.vii.1966, G. Ebert leg., Vojnits slides nos 19521♂, 19487♀, 19515♀, 19552♀ (SMNK; coll. Ratzel); 2♀, E Afghanistan, Salang-Nord, 2100 m, vic. Khindjan, 13.vi.1970, leg. Naumann, Nr. 1067, Ratzel slides nos GU25408/3w, GU25408/4w; 1♂, 1♀, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 23., 24.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 261 and 262; 1♀, same locality, 3450 m, Darrah-e-Shaur, 25.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 263 (SMNK); 4♀, same locality, 3400 m, Kotal-e-Dalez, W-Seite, 28.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 271 (SMNK; coll. Ratzel).

This is mainly a mountainous Central Asian species which has been recorded hitherto from Uzbekistan, Tajikistan, Kyrgyzstan, northern Pakistan, Jammu & Kashmir, India (Himachal Pradesh), Nepal, and was also found in the mountains of northern Thailand. It was recorded for the fauna of Afghanistan by Mironov et al. (2008c). *E. nigrilinea* is a univoltine summer species, present in habitats from about 1700 m up to about 4500 m above sea-level. The male genitalia were described and illustrated in Inoue (2000), the female in Vojnits (1981) and Viidalepp (1988) as *E. ingrata*.

Eupithecia barteli Dietze, 1908

Eupithecia barteli Dietze, 1908: Deutsche entomologische Zeitschrift, Iris **21** (2): 162, pl. 2, figs 13, 14. Syntypes 1♂, 2♀ (coll. K. Dietze and R. Püngeler in MNHU), [Kazakhstan]: Uralsk.

Eupithecia artshae Viidalepp, 1988: Fauna pyadenits gor Srednej Azii [Geometridae fauna of the Central Asian mountains]: 124, pl. 2, fig. 21; text-pl. 28, figs 2, 3, 6–8. Holotype ♂ (ZISP), Tadzh. SSR [Tajikistan]: SW Pamirs, Khorog, botanical garden, 2300 m (treated as subsp. of *Eupithecia barteli* Dietze, 1908 in Mironov 1990).

Material. Syntypes: ♀, **Kazakhstan**, Uralsk, 2.viii.1907 Max Bartel, *Barteli*, ♀ Type. Uralsk., Karl Dietze, Kann dies aberrative *subfulvata* sein? Dietze, Zool. Mus. Berlin, Mironov slide no. 480♀ (coll. K. Dietze in MNHU); 1♀, Uralsk, 24.vii.1905, 4/06 von M. Bartel, n. sp. (Dietze), n. sp. (Bohatsch), *Barteli* ♀ Type, K. Dietze (coll. R. Püngeler in MNHU). – Holotype of *E. artshae* ♂, **Tajikistan**, Pamir, Chorog, Nortes Botan., 2300 m, 29.viii.1965, M. Zaprjagaew (ZISP). – Paratypes of *E. artshae*: 2♀, same locality, 4.ix.1966, M. Zaprjagaew, Viidalepp prep. 2684♀, 2685♀ [ZISP microprep. 17087, 17088]; 1♀, Pamir occid., fl. Obi-Chingou, Lulicharwi, 10.viii.1959, 1750 m, A. Bundel. 1♀ (*nec* ♂), **Kyrgyzstan**, town Naryn, 23.vii.1982, Mironov V.G. (ZISP). **Afghanistan**: 1♀, centr., Bamian, 31.vii.1963, Kasy & Vartian, Vojnits slide no. 15139♀ (HNHM); 1♂, C Afghanistan, Koh-i-Baba, S-Seite, Panjao, 2650 m, 20–22.vii.1966, G. Ebert leg., Vojnits slide no. 19520♂ (SMNK).

This species is found in Tajikistan, Kyrgyzstan, Jammu & Kashmir, India (Himachal Pradesh), Nepal, and China (Shaanxi, Yunnan) from about 1300 m up to about 3000 m above sea-level, and its range extends to the southeast of European Russia and northwestern Kazakhstan in the north. A new species for the fauna of Afghanistan. *E. barteli* is a medium-sized species with distinctive broad and obtuse wings. The presence of a distinct and relatively large, black discal dot and light, ochreous medial area behind this discal dot on the forewing are very good characters to distinguish this species from

any other in this area. The male genitalia are very similar to those of other species of the *tripunctaria* group, but the female genitalia can be easily recognized by the large globular corpus bursae with elongated and narrow, S-shaped ductus bursae with numerous longitudinal striations and a row of short spines (Mironov 2003).

Eupithecia vetula Mironov & Ratzel, 2008

Eupithecia vetula Mironov & Ratzel, 2008: Transactions of the Lepidopterological Society of Japan **59** (2): 127, figs 4, 21, 28. Holotype ♂ (SMNK), Pakistan: Azad Jammu & Kashmir, Thunian, 2300–2700 m.

Material. Holotype ♂, **Pakistan**, Azad Jammu & Kashmir, Thunian, 2300–2700 m, 25–30.viii.2004, leg. V. Gurko, Ratzel slide no GU18505/3m (SMNK). – Paratypes: 8♂, 24♀, same locality, Ratzel slides nos GU18505/1m, GU18505/2w, GU21505/1w, GU21505/2w, GU22505/2w, GU25505/1w, GU25505/3w, GU27505/1m (SMNK, coll. Ratzel, BMNH); 1♀, SW Himalaja, Indus-Kohistan, Kaghantal, Naran, 3200–3400 m, 16.vii–5.viii.1977, leg. De Freina, Ratzel slide GU4507/4w (SMNS); 1♀, Himalaya Mts., Kaghan valley, Tathabaya, 73°26'E, 34°36'N, 2200 m, 1.v.1998, leg. Gy. M. László & G. Ronkay; 2♀, Himalaya Mts., Valley of Indus, between Chilas and Dassu, Motel Barseen, 1100 m, 10.x.1998, leg. Gy. M. László & G. Ronkay (HNHM). 1♀, **India**, Bhimtal, distr. Nainital, Kumaon-Himalaja, 1500 m, 10–22. ix.1986, leg. A. Hauenstein (ZFMK). E **Afghanistan**: 1♂, Sarobi, 1100 m, 13.iv.1961, leg. G. Ebert, Ratzel slide no. GU12312/6m (ZSM); 2♀, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 27.iv. and 5.vi.1968, M. Müller leg., Vojnits slides nos 19523♀, 19524♀ (SMNK).

This species, which belongs to the *lariciata* group (Bolte 1990), was not hitherto recorded from Afghanistan.

Eupithecia conjunctiva Hampson, 1895

Eupithecia conjunctiva Hampson, 1895: Fauna of British India (Moths) **3**: 400. Holotype ♀ (BMNH), [India]: Dharmsála.

Material. Holotype ♀, **India**, Dharmsála 87–59, *Eupithecia conjunctiva* Hmpsn. type ♀, BM Geom. slide no. 20315 (BMNH). SE **Afghanistan**: 1♀ Safed Koh, S-Seite, Kotkai, 2350 m, 2.viii.1967, M. Müller leg., Vojnits slide no. 19501♀ (HNHM), 1♂, same data, 1.vi.1968, Vojnits slide no. 17540♂ (SMNK).

This species of the *lariciata* group is found in northern Pakistan, Jammu and Kashmir, northern India (Punjab, Sikkim), and Nepal from about 1100 m to about 3000 m above sea-level. A new species for the fauna of Afghanistan. The male genitalia were described and illustrated in Inoue (2000) for the first time.

Eupithecia karnaliensis Inoue, 2000

Eupithecia karnaliensis Inoue, 2000: Tinea **16** (Suppl. 1): 34, pl. 165, fig. 21; figs 1299, 1339. Holotype ♂ (coll. Owada; Tokyo), [Nepal]: [Karnali], Jullya, 2690 m.
Misidentification: *Eupithecia emikoae* Inoue, 1996 (part paratypes ♂, ♀).

Material. Holotype ♂, **Nepal**, Karnali, Jumla Distr., Jillya, 2690 m, 29.ix.1981, M. Owada, Inoue slide no. 14137♂ (NSMT). – Paratypes of *E. emikoae*: 1♂, **India**, Kashmir, (Kangan-Wayul), Naranag, 2500 m, Aug. 16–18.1982, leg. H. Yoshimoto; 1♀, NW India, Kashmir, Pahalgam-Kolohoi, Lidderwat, 3000 m, Aug. 8–9.1982, leg. E. Yoshimoto (ZISP). E **Afghanistan**: 1♀, Nurisan-Bashgal, 19 km E of Kamu, 1500 m, 20.x.1970, Nr. 1139, leg. C. Naumann E-lep 209, Ratzel slide no. GU25408/2w; 1♂, same locality, vic. Barg-e-Matal, 2200 m, 21.x.1970, Nr. 1140, leg. C. Naumann E-lep 209, Ratzel slide no. GU24408/5m; 1♂, same locality, 18 km E of Kamu, 1500 m, 29.x.1970, leg. C. Naumann, Coll.-Nr. 1147, Ratzel slide no. GU24408/6m (SMNK).

A small mountainous species from the *propagata* group. The similarity and differences of *E. karnaliensis* to and from the allied species *E. caduca* Vojnits, 1984 were described

in detail in Mironov et al. (2008c). The male and female genitalia were described and illustrated in Inoue (2000). This little-known species had so far been recorded only from Great Western Himalaya Mts (Jammu & Kashmir) and Nepal at an altitude of about 2200 m up to about 3200 m above sea-level. First records for Afghanistan.

Eupithecia mustangata Schütze, 1961

Eupithecia mustangata Schütze, 1961: Veröffentlichungen der zoologischen Staatssammlung München **6**: 181, pl. 29, figs 4, 9; pl. 31, fig. 4; pl. 32, fig. 1. Holotype ♂ (ZSM), [Nepal]: Mustangbhot, 29°11'N, 83°58'E, Muktinath, 3500 m.

Eupithecia emikoae Inoue, 1996: Transactions of the Lepidopterological Society of Japan **47** (4): 237, figs 1, 2, 8, 11. Holotype ♂ (coll. H. Inoue in BMNH), [India/Pakistan]: Kashmir, Pahalgam-Kolohoi, Lidderwat (synonymised in Mironov et al. 2008a).

Material. Holotype ♂, **Nepal**, Mustangbhot, 29°11'n.Br. 83°58'ö.L., Muktinath, 3500 m, 5.viii.1955, leg. F. Lobbichler, Zoolog. Staatsslg., *mustangata* Schü. Holotypus. Präp. Nr. A 707♂ det. E. Schütze, Kassel, ZSM G13367, photo 84 B 27 det. A. Vojnits (ZSM). – Paratype: 1♀, **Nepal**, Mustangbhot, 29°11'n. Br. 83°58'ö.L., Mustang, 3800 m, 14.viii.1955, leg. F. Lobbichler, Zoolog. Staatsslg., *mustangata* Schü. Allotypus. Präp. Nr. A 710♀ det. E. Schütze, Kassel, ZSM G13368, photo 84 B 28 det. A. Vojnits (ZSM). – Holotype of *E. emikoae* ♂, **India**, Kashmir, Pahalgam-Kolohoi, Lidderwat (3000 m), Aug. 8–9.1982, leg. E. Yoshimoto, Inoue Coll. B.M. 1992–71, Type status verified K. Buckmaster 1997, BM Geom. slide no. 22012 (coll. H. Inoue in BMNH). NE **Afghanistan**: 1♂, 1♀, Badachschan, Bela Kuran, 2900 m, 12–29. vii.1963, leg. K. Omoto (ZSM); 1♂, E-Afghanistan, Nuristan, Bashgal, vic. Barg-e-Matal, Dandizenor, 3300 m, 13.vii.1970, Nr. 1122, leg. C. Naumann, Ratzel slide no. GU9408/5m; 1♀, NE Afghanistan, Wakhan-Tal, Sarhad, 3150 m, 6.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 232; 1♂, 5♀, same locality, 3300 m, Zemestani Baharak, 23, 24.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 261 and 262; 3♀, same locality, 3450 m, Darrah-e-Shaur, 25.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 263; 8♂, 28♀, same locality, 3400 m, Kotal-e-Dalez, W-Seite, 27., 28., 29.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 269, 271 and 272 (SMNK).

This very variable species in size, depth of colour, and the breadth of transverse lines was previously known only from the mountains of northern Pakistan, Jammu & Kashmir, northern India (Himachal Pradesh), and Nepal from about 2100 m up to about 4300 m above sea-level. It is now newly recorded from Afghanistan. The male and female genitalia were described and illustrated in Schütze (1961a).

Eupithecia pamirica Viidalepp, 1988

Eupithecia pamirica Viidalepp, 1988: Fauna pyadenits gor Srednej Azii [Geometridae fauna of the Central Asian mountains]: 117, pl. 2, fig. 14; text-pl. 26 (*nec* 25 and 32, fig. 11), figs 14–17 (*nec* 8–11). Holotype ♀ (IAET), Tajikistan: Mts. Darwaz, cliv. merid., fl. Wischarvi, 1800 m.

Material. Holotype ♀, **Tajikistan**, Mts. Darwaz cliv. merid., fl. Wischarvi, 1800 m, 8.viii.1958, A. Bundel (IAET). – Paratypes: 1♂, same data (ZISP); 1♀, Pamir mer. occ., fl. Gunt, 2700 m, 29.vii.1952, Bundel (ZISP); 1♂, Pamir mer. occ., Chorog, 2500 m, 10.viii.1956, Hortus Botan., A. Bundel (ZISP). E **Afghanistan**: 5♂, Salang-Pass, N-Seite, Khinjan, 2100 m, 5–11.vii.1966, G. Ebert leg., Vojnits slides nos 17874♂, 17875♂, 17876♂, 17877♂ (SMNK; coll. Ratzel); 1♂, C Afghanistan, Koh-i-Baba, N-Seite, Band-i-Amir, 2900 m, 24–26.vii.1966, G. Ebert leg., Vojnits slide no. 19522♂ (SMNK); 1♂, 1♀, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 4.viii, 1.ix.1967, M. Müller leg., Vojnits slides nos 16977♂, 19527♀ (SMNK).

This little-known, small species, which is common in the mountainous areas of Central Asia at altitudes from about 1800 m up to about 3500 m above sea-level, has been recorded from Tajikistan (Darvazsky Mts., Ghissarsky Mts., SW Pamirs), Kyrgyzstan (Tchatkal Nature Reserve), and Pakistan (Deosai Mts., Great West. Himalaya Mts.,

Karakoram Mts.). These are new records for Afghanistan. The details of the male and female genitalia were described and illustrated by Viidalepp (1988).

***Eupithecia tabestana* Mironov & Ratzel, sp. n.** **Figs 2, 3, 17, 21**

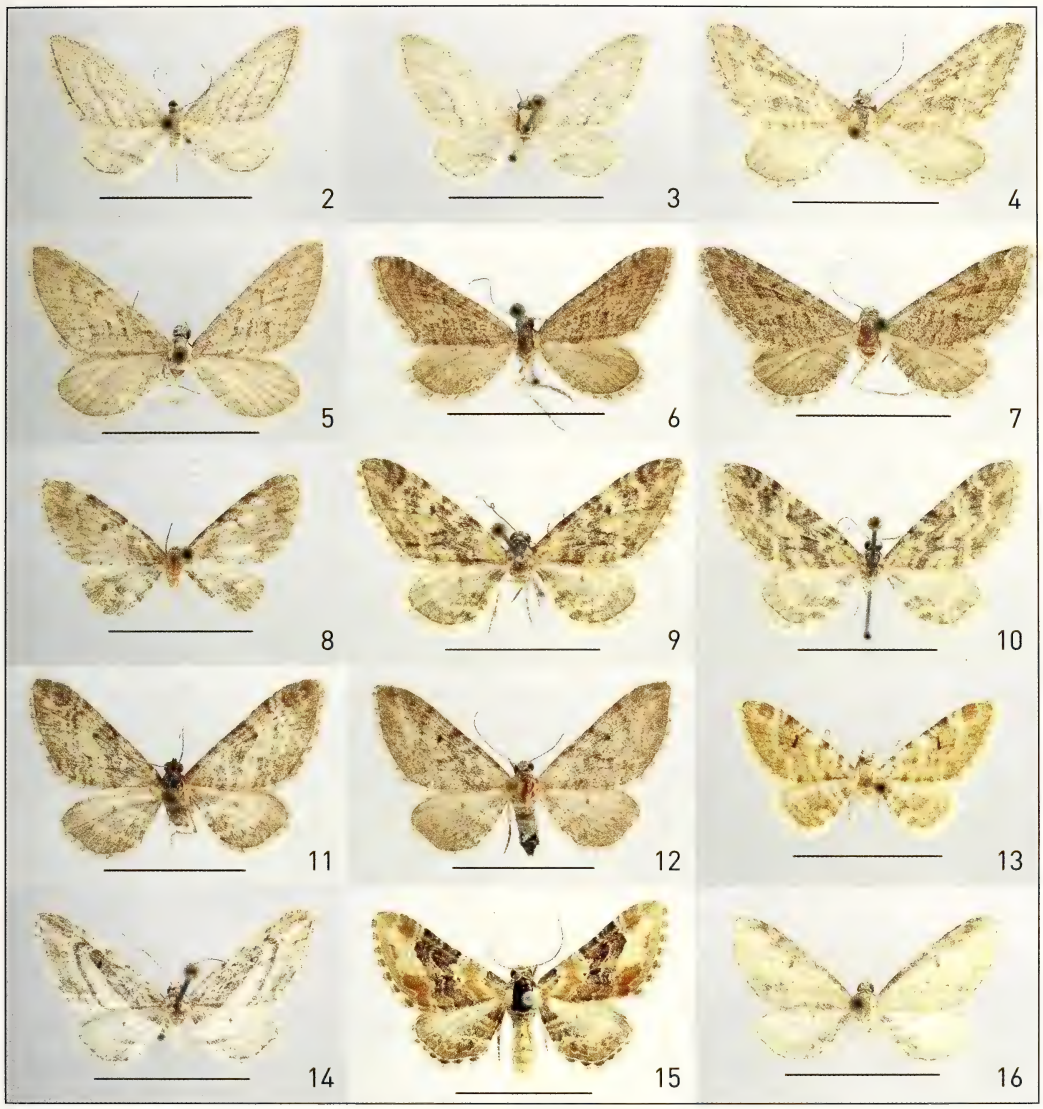
Misidentification: *Eupithecia anemica*: *sensu* Mironov et al. 2008b (*nec* Viidalepp 1988).

Material. Holotype ♀, NE **Afghanistan**, Wakhan-Tal, 3450 m, Darrah-e-Shaur, 25.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 263; *Eupithecia anemica* Viid., Ratzel slide no. GU9208/1w, det. U. Ratzel (coll. Ratzel). – Paratypes: 1♀, SE Afghanistan, Prov. Paktia, 2350 m, Safed Koh, S-Seite, Kotkai, 16–17. vi.1971, Ebert & Naumann, UV-Li, Ratzel slide no. GU9208/3w (SMNK); 2♂, 4♀, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 23, 24.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 261 and 262, Ratzel slides nos GU291109/7m, GU291109/2w, GU9208/2w, Mironov slide no. 864♂ (SMNK; 1♂ and 1♀ in ZISP). 2♀, **Pakistan**, West, Great Himalaya Mts., Near Gabar, 3200 m, 21–24.viii.2004, leg. Gurko, coll. Ratzel, Ratzel slides nos GU9705/1w, GU9705/2w; 1♂, NE Pakistan, Az. Jammu & Kashmir, n. Jankar, 4200–4500 m, 10–20.viii.2009; leg. Gurko (coll. Ratzel); 1♂, NE Pakistan, Az. Jammu & Kashmir, Kaghan valley, n. Naran, 2800 m, 19–20.viii.2009, leg. Gurko (coll. Ratzel). **Nepal**, Dhaulagiri: 1♀ above Marpha, Yak Kharka, 3850 m, 15.vi.2012, Ratzel slide no. GU24912/1w, 1♀ Mukthinath Himal, Lupra, Bonpo Gompa, 3150 m, 12.vi.2012, , Ratzel slide no. GU24912/2w, leg. Balász Benedek (coll. Ratzel).

Description. Wingspan 15.0–17.0 mm; length of forewing 8.0–9.0 mm. Labial palpi short, about two times shorter than diameter of eye, covered with light brown scales. Frons, vertex, and notum almost unicolorous, yellowish white. Forewing narrow, elongated, with straight costal margin, almost straight, oblique termen and pointed apex; evenly unicolorous, pale yellowish grey, irrorated by numerous light brown scales; transverse lines invisible except very narrow, light brown, oblique ante- and postmedial; discal dot absent. Hindwing narrow, elongated, paler, also unicolorous yellowish grey, irrorated with light brown scales, with more or less visible, light brown, medially right angled onto costa postmedial transverse line only; discal dot invisible; terminal lines on all wings brown; fringe pale, yellowish grey, almost dirty white, slightly chequered light brown. Abdomen unicolorous, yellowish white.

Male genitalia (Fig. 17). Uncus medium-length, narrow, biapical. Valve shaped like a lemon segment, relatively small, narrow, with almost parallel dorsal and ventral margins; apex rounded; sacculus weakly sclerotized. Vinculum short, medium width, semicircular. Papillae on the anterior arms of the labides small, covered with sparse setae at apices. Phallus small, slim, much shorter than length of valve. Vesica armed with one small piece near ductus ejaculatorius base, one elongated and narrow, oblique plate-like cornutus, one heavily-sclerotized horn-like cornutus and two apical horn-like cornuti of original shape. Sternite A8 small, elongated, with almost parallel lateral margins, slightly asymmetrical basal lobes and two short, narrow, spine-like, sclerotized and divering apical rods.

Female genitalia (Fig. 21). Bursa copulatrix small, ovate-oblong, membranous, with four patches of spines: the basal patch with very small and almost invisible spinules, two elongated lateral patches of larger and longer spines, and one transverse patch of very small, short spines from base of ductus seminalis to base of colliculum. Ductus bursae indistinguishable from corpus bursae. Ductus seminalis very broad, broadly attached to the middle of corpus bursae. Colliculum collar-like, small and relatively short. Antrum membranous. Tergite A8 small, trapezoid. Anterior and posterior apophyses short and narrow. Papillae anales small, short, rounded, covered with short setae.



Figs 2–16. Adults of *Eupithecia* species (scale bar = 10 mm). **2**. *E. tabestana* Mironov & Ratzel, sp. n. (holotype, ♀). **3**. *E. tabestana* Mironov & Ratzel, sp. n. (paratype, ♂). **4**. *E. obtinens* Brandt, 1941 (♀). **5.** *E. assectata* Dietze, 1904 (♀). **6**. *E. fredi* Mironov & Ratzel, sp. n. (holotype, ♂). **7**. *E. fredi* Mironov & Ratzel, sp. n. (paratype, ♀). **8**. *E. infecunda* Vojnits, 1981 (♀). **9**. *E. xanthomixta* Vojnits, 1988 (♀ from type-locality). **10**. *E. xanthomixta* Vojnits, 1988 (♀ from type-locality). **11**. *E. naumanni* Mironov & Ratzel, sp. n. (holotype, ♀). **12**. *E. naumanni* Mironov & Ratzel, sp. n. (paratype, ♀). **13**. *E. nachadira* Brandt, 1941 (♀). **14**. *E. decipiens* Petersen, 1910 (♂). **15**. *E. subpulchrata* Alphéraky, 1883 (♀). **16**. *E. ochrovittata* Christoph, 1887 (♂).

Diagnosis. This species appears to belong to the *fletcherata* group and is externally very similar to *E. anemica* Viidalepp, 1988, but clearly distinguished from it by the complete absence of medial transverse lines and discal dots on forewings. The male genitalia of *E. tabestana* have a longer uncus, longer valve with broader apex, straight horn-like cornutus and two different apical cornuti on the vesica of phallus than in *E.*

anemica; the apical rods of the eighth sternite are straight and divering (in *E. anemica* they are pincers-like). The female genitalia of *E. tabestana* can be distinguished from those of *E. anemica* by the broader ductus seminalis, smaller medial patches of spines in the corpus bursae, and also trapezoid eighth tergite.

Distribution. East Afghanistan, northern Pakistan, and central Nepal.

Eupithecia obtinens Brandt, 1941 — Fig. 4, 22

Eupithecia obtinens Brandt, 1941: Mitteilungen der Münchner entomologischen Gesellschaft **31** (3): 875, pl. 29, fig. 28. Holotype ♂ (NHRS), [Iran]: Kouh i Binaloud, 2500–3300 m.

Eupithecia eberti Vojnits, 1978 **syn. n.**: Acta Zoologica Academiae Scientiarum Hungaricae **24** (3–4): 436, fig. 7. Holotype ♂ (HNHM), Iran (northeast): Kuh i Mirabi, 2200 m.

Incorrect subsequent spelling: *obtines*: Mohammadian (2006).

Misidentification: *Eupithecia sutiliata*: sensu Schütze 1961b (*nec* Christoph 1877).

Material. Holotype ♂, **Iran**, Khorassan, Kouh i Binaloud (Meched), 2800 m, 18. Juli 1938, Coll. Brandt, 96./57, coll. RMS, Holotype *Eupithecia obtinens* Brdt. Brandt, R.M. prep. 4916, *sutiliata* Chr. Präp. Nr. A 898♂ det. E. Schütze, Kassel, photo 28 A 80 det. A. Vojnits (NHRS). – Paratypes: 1♀, Iran, Khorassan, Kouh i Binaloud (Meched), 2500 m, 16. Aug. 1938, Coll. Brandt, coll. RMS, Allotype *Eupithecia obtinens* Brdt. Brandt, 52, photo 29 A 80 det. A. Vojnits; 1♀, same locality, 2800 m, 15. Juli 1938, Coll. Brandt, Paratype *Eupithecia obtinens* Brdt. Brandt, 53; 1♂, same locality, 3000 m, 25.vii.1938, coll. Brandt, Paratype *Eupithecia obtinens* Brdt. Brandt, Vojnits slide no. 744♂ (NHRS); 1♀ (?), Iran, Khorassan, Kouh i Binaloud (Meched), 3000 m, 30.vii.1938, coll. Brandt, Brit. Mus. 1964, 454 (BMNH). – Holotype of *E. eberti* ♂, **Iran**, Kuh i Mirabi, Geröllzone, 2200 m, Juli-Anf. Aug., Exp. Wernicke, Vojnits slide no. 11342♂ (HNHM). NE **Afghanistan**: 3♀, Badachschan, Bela Kuran, 2900 m, 12–29.vii.1963, leg. K. Omoto (ZSM); 2♂, 1♀, C Afghanistan, Koh-i-Baba, S-Seite, Shah-tu-Pass, 3000 m, 17–19. vii.1966, G. Ebert leg., Vojnits slides nos 17563♂, 19510♂, 17562♀ (SMNK); 1♂, centr., Band-i-Amir, 67°L / 34°25'B, 2800 m, 15–16.vii.1971, leg. Vartian, Vojnits slide no. 15106♂ (HNHM); 1♀, Salang, 2700 m, 3–6.vii.1975, leg. W. Thomas (coll. Sommerer).

Brandt has described only the habitus of this species. The male genitalia were described and illustrated by Schütze (1961b) on the basis of slide A898♂ for the first time. However, Schütze treated this species as *E. sutiliata* Christoph, 1877 and synonymised the species name *E. obtinens* with this later in the text erroneously. In fact, two type-specimens (lectotype male and paralectotype female) of *E. sutiliata* are deposited, respectively, in the collections of ZISP (Saint Petersburg) and BMNH (London), from where Schütze did not study any material. Later on, the male genitalia of *E. obtinens* were described and illustrated by Vojnits (1978) again as *E. eberti*. The female genitalia of *E. obtinens* were previously unknown. We therefore include a description and illustration of the female genitalia.

Female genitalia (Fig. 22). Bursa copulatrix relatively large, pouch-like, evenly tapered to colliculum, with characteristic heavily sclerotized, rounded protuberance on one side near base, and with patch of longer spines in this protuberance; corpus bursae about one half covered with slim spines. Ductus bursae not distinctly separated from corpus, with one or two patches of small spines near base of colliculum. Ductus seminalis narrow, slightly broadened basally, attached to medium part of corpus bursae opposite of heavily sclerotized basal sack. Colliculum collar-like, rather short and broad. Antrum short and broad, membranous. Tergite A8 rectangular, with rounded posterior corners. Anterior and posterior apophyses very narrow, medium length, tapered apically. Papillae anales narrow, short, rounded, covered with medium-sized setae.

Eupithecia assectata Dietze, 1904 **Fig. 5**

Eup[*ithecia*] *assectata* Dietze, 1904: Deutsche entomologische Zeitschrift, Iris (1903) **16** (2): 346, pl. 3, figs 20, 21. Syntypes 7, ♂, ♀ (coll. K. Dietze in MNHU), Central Asia [Uzbekistan]: Tura; Samarkand; [Kyrgyzstan]: (near lake) Issyk-Kul; Togus-torau (Kogard-tau).

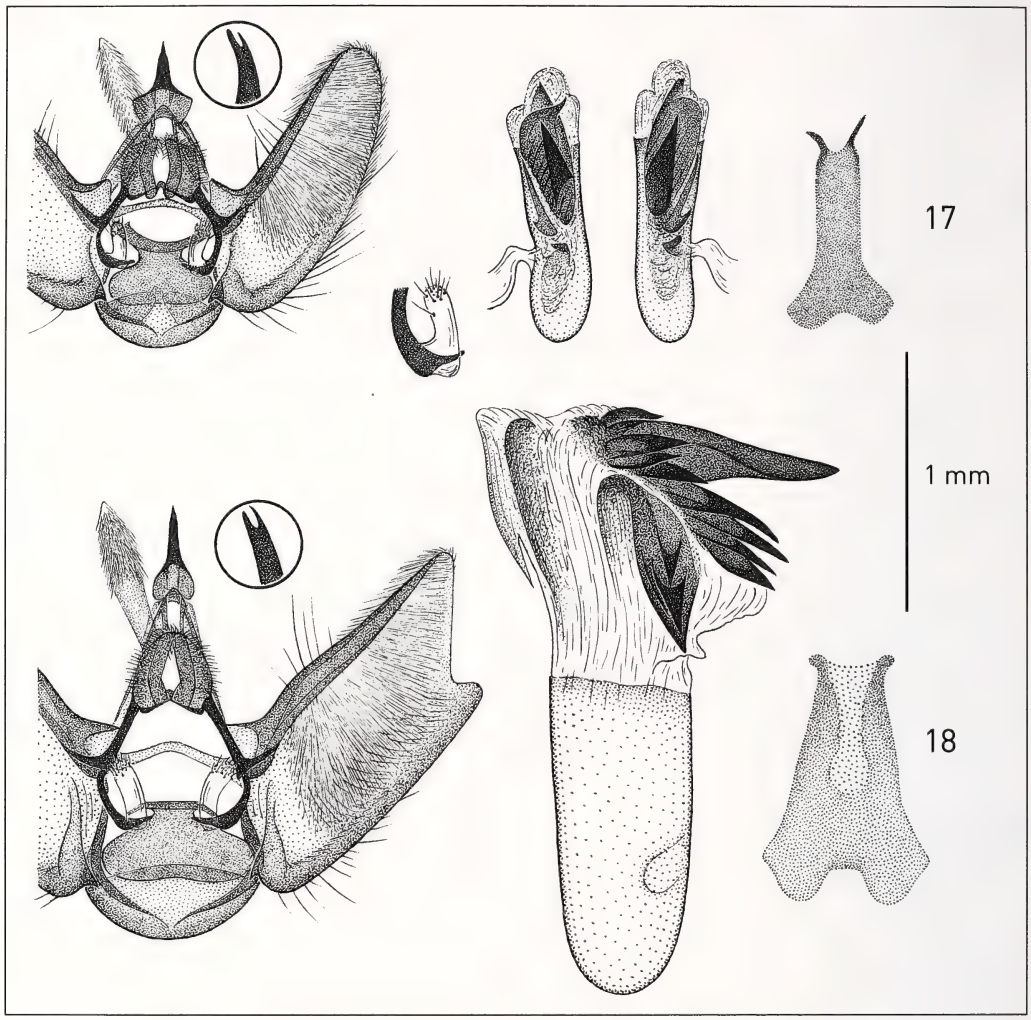
Material. Syntypes: 1♂, Asia, **Uzbekistan**, Samarkand, E 1893, 21, 32, *assectata* n. sp., Original (K. Dietze), ♀ hat Stgr auch von Samarkand A205 Hbhr., Genital-Unters. Nr. Eu 72, Zool. Mus. Berlin. 1♀, **Kyrgyzstan**, Togus Tjurae, Kogard Tau, *assectata* n. sp. Type (coll. K. Dietze in MNHU). **Afghanistan**: 1♂, Pagman-Gebirge (Kabul), *ca.* 3000 m, Juni–Juli 1942, coll. Brandt, R.M. prep. 4912, 7474 E94+, *E. subundata* Schü., Präp. Nr. S 1208♂ det. E. Schütze, Kassel, Monotypus *Eup. subundata* Schü. (undescribed), E. Schütze, Kassel, Naturhistoriska Riksmuseet Stockholm, Loan no 367/06 (NHRS); 1♀, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 14–17.viii.1966, G. Ebert leg., Vojnits slide no. 19535♀; 1♂, 2♀, E Afghanistan, Salang-Nord, 2100 m, vic. Khindjan, 13.vi.1970, leg. C. Naumann, Nr. 1067, Ratzel slides nos GU25911/1m, GU1109/5w, GU25911/2w; 6♂, 8♀, NE Afghanistan, Prov. Badakhshan, 15 km NE of Baharak, Kotal-e-Zardeu, 3000 m, 28, 30.vi.1971, UV-Li, Ebert & Naumann, coll. Nr. 226 and 230, Ratzel slides nos. GU301011/1m, GU301011/2m, GU301011/3w, GU301011/4w, GU41111/1w; 2♀, C Afghanistan, Koh-i-Baba, N-Seite, Band-i-Amir, 2900 m, 24–26.vii.1966, G. Ebert leg., Vojnits slides nos 17764♀, 19488♀; 1♂, E Afghanistan, Salang-Pass, N-Seite (Khinjan), 2100 m, 5–11.vii.1966, G. Ebert leg., Vojnits slide no. 19494♂; 4♀, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 10, 23.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242 and 261, Ratzel slide no. GU24911/6w; 1♀, same locality, Sarhad, 3150 m, 9.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 240 (SMNK).

This is a very variable species, forewings varying from pale grey unicolorous almost without pattern to specimens with dark grey colouration and very distinct blackish transverse lines on the forewings. According to structure of the female and male genitalia, especially rows of horn-like cornuti on the vesica, this species belongs to the *fletcherata* group and at least appears related to *E. obtinens* Brandt, 1941. The male and female genitalia were described and illustrated in De Laever (1960) and afterwards in Viidalepp (1988). This is a Central Asian mountainous species distributed in Uzbekistan, Tajikistan, Kyrgyzstan, Afghanistan, and Kashmir at altitude from about 2350 m up to about 3750 m above sea-level. First records for Afghanistan.

Eupithecia fredi Mironov & Ratzel, sp. n. **Figs 6, 7, 18, 23**

Material. Holotype ♂, **Afghanistan**, Pagman-Gebirge, 25 km NW of Kabul, ca. 2500 m, 17.vi.1941, leg. Fred Brandt, Vojnits slide no. 17031♂ (SMNK). – Paratypes: 8♂, 3♀, same data, Vojnits slides nos 17027♂, 17028♂, 17030♂, 17034♂, 17035♂, 17036♂, 17037♂, 17038♂, 17029♀, 17032♀, 17033♀ (SMNK; 1♂ and 1♀ in ZISP); 1♂, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 1.ix.1967, M. Müller leg., Vojnits slide no. 16969♂ (SMNK).

Description. Wingspan 18.0–22.5 mm; length of forewing 9.0–11.5 mm. Labial palpi equal or shorter than diameter of eye, covered with mixture of light brown and grey scales. Frons, vertex, patagia, and notum pale grey with scattered brown scales. Forewing narrow, elongated, with straight costal margin, curved near apex only, almost straight, oblique termen and pointed apex; ground colour brownish grey; transverse lines oblique, slightly wavy posteriorly, right or sharply angled onto costa; medial line usually more sinuate, oblique, and sharply angled onto costa, terminal area with almost straight or slightly wavy, oblique whitish subterminal line; discal dot usually invisible. Hindwing ovoid, almost unicolorous, brownish grey but lighter than forewing; terminal area slightly darker; transverse lines indistinct except ante- and postmedial at anal margin; discal dot invisible. Fringe on all wings distinctly chequered brownish grey and dirty white.



Figs 17–18. Male genitalia of *Eupithecia* species (scale bar = 1 mm: with sternite A8, and lateral view of uncus and papillae on the anterior arms of labides enlarged). **17.** *E. tabestana* Mironov & Ratzel, sp. n. **18.** *E. fredi* Mironov & Ratzel, sp. n.

Male genitalia (Fig. 18). Uncus narrow, elongated, biapical. Valve medium-sized, with almost straight and parallel costal and ventral margins; ventral margin with obtuse process placed near apex of valva; apex of valva very narrowly rounded; sacculus rather sclerotized (see remarks). Vinculum short, broad, semicircular. Papillae on the anterior arms of the labides medium-sized, covered with short setae at apices. Phallus large, broad, almost equal to valval length. Vesica armed with one elongated plate-like cornutus and some horn-like, heavily sclerotized cornuti, which group into two rows (one longer than other with one much larger and longer cornutus). Sternite A8 short and broad, with two broad, sharply tapered and slightly apically divering arms; basal emargination relatively narrow and deep; apical hollow membranous, narrow and deep.

Female genitalia (Fig. 23). Bursa copulatrix pouch-like, relatively small, short and broad, sclerotized, with numerous longitudinal wrinkles, armed with two patches of spines (one basal along anterior wall of bursa of slim spines with much larger some lateral spines on both sides, and other smaller, oblique patch of small spines near base of colliculum). Ductus bursae indistinct from corpus. Ductus seminalis narrow, slightly broadened at base, attached to medium part of corpus bursae. Colliculum collar-like, short and very broad. Antrum short and broad, membranous. Tergite A8 rectangular. Anterior and posterior apophyses short and narrow. Papillae anales relatively small, short and narrow, tepered apically, covered with long and medium-sized setae.

Diagnosis. This species appears to belong to the *fletcherata* group. It is externally similar to *E. assectata* Dietze, 1904, but can be distinguished from it by the narrower forewing with more pointed apex and more oblique termen. There are no significant differences in the colouration and pattern of the wings between these species. The male genitalia of the new species are most similar to those of *E. assectata*, but can be distinguished from it by the narrower basal part of uncus, with longer and narrower apical part, very different shape of valva with straight ventral margin almost parallel to dorsal margin, the presence of a short and obtuse process on ventral margin near the apex, which is narrower in the new species than in *E. assectata*. The cornuti on the vesica of *E. fredi* are larger on the whole, with one very large cornutus, which slightly shorter than the phallus of *E. assectata*. The sternite A8 broader, with longer apical arms and deeper basal and membranous apical emargination than in the male of *E. assectata*. The female genitalia of *E. fredi* can be easily separated from those of *E. assectata* by the more sclerotized corpus bursae with longer, numerous longitudinal wrinkles, broader colliculum, the presence of two patches of much larger and longer marginal spines in the spiniferous area and narrower anterior and posterior apophyses.

Distribution. East Afghanistan.

Etymology. This species is named in honour of the German lepidopterologist Fred Brandt. He was one of the first collectors of Lepidoptera in Afghanistan. There is an interesting story about his collecting of material of *Eupithecia fredi*. Speaking Farsi fluently, in the 1930s F. Brandt was very active in Iran, where he found a lot of new species of Geometridae and Noctuidae. These were described by his brother Wilhelm Brandt, living in Helsinki, Finland. At that time the two of them had a good working relationship with the well-known British lepidopterist E. P. Wiltshire CBE and they dedicated several species to him (e.g. *Idaea wiltshirei* Brandt, 1938 and *Xanthorhoe wiltshirei* Brandt, 1941). Shortly afterwards, as the political climate changed, they found themselves standing on the opposing sides. Fred Brandt visited Afghanistan during the Second World War in the years 1941 and 1942. He was there on an official mission of the German Abwehr (Foreign Intelligence Service). In the night of 18/19 July 1941, together with Dr. M. Oberdörffer, a medical doctor and specialist in tropical medicine, they came under fire in Logar near Kabul (the so called "Logar incident"). Fred Brandt was badly injured, and his partner died. Four weeks before this, Brandt remarkably found time to collect moths in the Paghman area! The main part of the type series of *Eupithecia fredi* was collected there in that period. Nearly all other specimens from this collecting event were lost.

Remarks. All Vojnits slides of genitalia in the type-series of this species were boiled for too long, and unfortunately this left crucial details barely, if at all, visible.

Eupithecia nepalata Schütze, 1961

Eupithecia nepalata Schütze, 1961: Veröffentlichungen der zoologischen Staatssammlung München **6**: 179, pl. 29, figs 1, 6; pl. 30, figs 1, 1a, 1b, 2. Holotype ♂ (ZSM), Nepal: Mustangbhot, 29°11'n, Br. 83°58'ö.L., Kehami, 3700 m.

Eupithecia abundeli Vojnits, 1988: Annales Historico-Naturales Musei Nationalis Hungarici **80**: 83, pl. 2, figs 13, 14; pl. 6, figs 41–44. Holotype ♀ (ZISP), [Tajikistan]: Pamir, Schach-Darensis Mts, Cliv. Sept., Badjond-Dara River, 3500 m (synonymised in Mironov et al. 2008b).

Eupithecia petrensis Mironov, 1989: Entomologicheskoe Obozrenie **68** (2): 371, figs 9–11. Holotype ♂ (ZMMU), Tajikskaya SSR [Tajikistan]: Khorog, Botanical Garden (synonymised in Mironov et al. 2008b).

Material. Holotype ♂, **Nepal**, Mustangbhot, 29°11' n. Br., 83°58' ö. L., Kehami, 3700 m, 12.viii.1955, leg. F. Lobbichler, ZSM slide no. G3892♂ (ZSM). – Paratype: ♂, Nepal, Mustangbhot, 29°11'n.Br., 83°58'ö.L., Penga, 3800 m, 8.viii.1955, leg. F. Lobbichler (ZSM). – Holotype of *E. abundeli* ♀, **Tajikistan**, Pamir, Mts. Schach-Darensis, cliv. sept., fl. Badjond-Dara, 3500 m, 31.vii.1961, Bundel, Vojnits slide no. 17689♀ (ZISP). – Holotype of *E. petrensis* ♂, **Tajikistan**, Khorog, Botanical Garden, 24.vii.1958, leg. A. Tzvetajev (ZMMU). NE **Afghanistan**: 2♂, Badachschan, Bela Kuran, 2900 m, 12–29.vii.1963, leg. K. Omoto (ZSM); 1♀, E Afghanistan, Nuristan: Bashgal, vic. Barg-e-Matal: Dandizenor, 3000 m, 13.vii.1970, Nr. 1122, leg. C. Naumann, Ratzel slide no. GU24911/8w (SMNK); 2♂, 15♀, Wakhan-Tal, 3300 m, Zemestani Baharak, 23, 24.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 261 and 262, Ratzel slides nos GU12208/3m, GU9208/6w, GU15208/1w, GU15208/2w, GU15208/4w, GU24911/1w (SMNK and coll. Ratzel); 3♀, same locality, 3450 m, Darrah-e-Shaur, 25.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 263, Ratzel slide no. GU14208/3w (coll. Ratzel).

A Central Asian mountainous species, which is externally similar to the common *E. relaxata* Dietze, 1904. It had hitherto been recorded from Tajikistan, northern provinces of Pakistan and India, and from Nepal. It has not been previously recorded from Afghanistan.

Eupithecia thermosaria Hampson, 1903

Eupithecia thermosaria Hampson, 1903: Journal of the Bombay Natural History Society **14** (4): 644. Holotype ♀ (BMNH), [India]: Kashmir, Kokser.

Eupithecia jaani Mironov, 1989: Entomologicheskoe Obozrenie **68** (2): 370, figs 5–8, 13. Holotype ♂ (ZISP), Tadzhikskaya SSR [Tajikistan]: Vanchsky Mts, Abdukagor Ravine, Dal'nee, 2900 m (synonymised in Mironov et al. 2008b).

Misidentification. *Eupithecia scortillata*: *sensu* Viidalepp 1988 (*nec* Dietze 1904).

Material. Syntypes: 1♀, **India**, Leech Coll. 1900–64, Kashmir, Thompson, Type, *Eupithecia thermosaria* Hmpsn. type ♀, Figured in Seitz, Vol. 4, BM Geom. slide no. 11805; 1♀, Kokser, H McArthur coll., July 1888 (BMNH). – Holotype of *E. jaani* ♂, **Tajikistan**, Wantsch, fl. Abdukagor, loc. Dalnee, 2900 m, 9.viii.1955, A. A. Bundel, *E. scortillata* ?, 47, Viidalepp praep. no. 2347♂ (ZISP). – Paratypes of *E. jaani*: 3♂, 1♀, same locality, 9, 10.viii.1955, A. A. Bundel, Viidalepp praep. no. 2348♀; 1♂, Pamir merid. occid., Mts. Schachdarensis cliv septr., fl. Seidj-Dara, 3250 m, 27.vii.1957, A. Bundel, Viidalepp praep. no. 2355♂; 1♂, same locality, fl. Schobeg, 2500 m, 5.viii.1959, A. A. Bundel; 1♀, Darwaz occid., Mts. Chazreti-Scho, fl. Don Duschkan, 25.vii.1959, 2200 m, A. A. Bundel, Viidalepp praep. no. 2339♀; 1♀, Ghissarsky Mts., Takobskoe gorge, 12.viii.1953, Potopolsky, Viidalepp praep. no. 2354♀; 1♀, Pamirian highway, vill. Alichur, 25.vii.1980, V. Prasolov, Viidalepp praep. no. 2595♀ (ZISP). C **Afghanistan**: 1♂, Koh-i-Baba, S-Seite, Panjao, 2650 m, 20–22.vii.1966, G. Ebert leg., Vojnits slide no. 19556♂ (SMNK); 3♂, 1♀, same locality, N-Seite, Band-i-Amir, 2900 m, 24–26.vii.1966, G. Ebert leg., Vojnits slides nos 17761♂, 17762♂, 17763♂, 19532♀ (SMNK; coll. Ratzel); 1♀, same data, Vojnits slide no. 19533♀ (HNHM); 1♂, E Afghanistan, Nuristan, Bashgal, vic. Bang-e-Matal, Jandizenor, 3000 m, 13.vii.1970, Nr. 1122, leg. C. Naumann; 1♂, 1♀, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 10.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242, Ratzel slide no. GU291109/5m; 1♀, same locality,, 3450 m, Darrah-e-Shaur, 25.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 263, Ratzel slide no. GU291109/3w

(SMNK); 2♀, same locality, 3400 m, Kotal-e-Dalez, W-Seite, 27.vii.1971, Ebert & Naumann, UV-Li, coll. Nr. 269 (SMNK; coll. Ratzel); 1♂, same locality,, Sargaz, 2930 m, 11.viii.1971, UV-Li, Ebert & Naumann, coll. Nr. 290 (SMNK).

This species has hitherto been recorded from Jammu & Kashmir, Kyrgyzstan, and Tajikistan. It had not previously been recorded from Afghanistan. It is distributed in the mountains at altitudes from 2800 up to 4500 m above sea-level. The details of the male (phallus, cornuti, and eighth sternite) and female (corpus bursae) genitalia of *E. thermosaria* were described and illustrated in Viidalepp (1988) erroneously as *E. scortillata* Dietze, 1904. Later, this species was described again as *E. jaani* Mironov, 1989.

Eupithecia costipicta Warren, 1893

Eupithecia costipicta Warren, 1893: Proceedings of the Zoological Society London **1893** (2): 383, pl. 30, fig. 21. Holotype ♀ (BMNH), [India]: Sikkim, 8000 ft.

Material. Holotype ♀, **India**, Sikkim, O. Möller, 8000, 89, *Eupithecia costipicta* Warr. Type ♀, Collectio H. J. Elwes, BM Geom. slide no. 20130 (BMNH). SE **Afghanistan**: 1♀, Safed Koh, S-Seite, Kotkai, 2350 m, 9.ix.1967, M. Müller leg., Vojnits slide no. 17567♀ (SMNK).

This is a rare Asian mountainous species, which belongs to the *subfuscata* group and is distributed in Jammu & Kashmir, Nepal, India (Sikkim), and Central China (Hubei, Hunan) from about 2300 m up to about 3500 m above sea-level. Not hitherto known from Afghanistan.

Eupithecia vivida Vojnits & De Laever, 1978

Eupithecia vivida Vojnits & De Laever, 1978: Acta Zoologica Academiae Scientarum Hungaricae **24** (1–2): 238, figs 18, 20. Holotype ♀ (ZFMK), China: North Yunnan, Li-kiang.

Eupithecia producta Vojnits, 1981: Annales Historico-Naturales Musei Nationalis Hungarici **73**: 222, fig. 3. Holotype ♀ (SMNK), India (north): Kumaon Bhimtal (Nainital), 1450 m. [Junior primary homonym of *Eupithecia producta* Bastelberger, 1911; Peru.]

Eupithecia wolfi Vojnits, 1985: Acta Zoologica Hungarica **31** (1–3): 272. [Replacement name for *Eupithecia producta* Vojnits, 1981] (synonymised in Mironov et al. 2008b).

Material. Holotype ♀, **China**, Provinz Nord-Yuennan, Li-kiang [Lijiang], X, 17.iii.1935, H. Höne, Vojnits slide no. 11057♀ (ZFMK). – Paratypes: 13♂, 12♀, same locality, 26–27, 30.viii, 24.ix.1934, 9., 11., 13–14., 17–19., 21–25., 28., 31.iii, 2–3, 5, 20.iv.1935, H. Höne, Vojnits slides respectively nos 10901♂, 10884♂, 11012♂, 11011♀, 11010♀, 10996♂, 11025♀, 10881♂, 10995♀, 11056♀, 10904♀, 11058♀, 11024♀, 11003♂, 11051♂, 11050♀, De Laever slides respectively nos 212♀, 371♂, 222♂, 228♀, 344♂, 221♂, 345♀, 210♀, 209♂ (ZFMK); 11♂, 12♀, same locality, 8–9., 11–14., 19–21., 23–25., 28.iii, 3.iv, 6.ix.1935, H. Höne, Vojnits slides nos 10885♀, 10929♂, 10961♂, 10985♂, 10986♀, 10987♀, 10988♀, 10993♀, 10994♀, 11005♀, 11006♀, 11008♀, 11009♀, 11013♀, 11018♂, 11020♂, 11026♀, 11052♂, 11053♂, 11054♂, 11055♂ (two specimens without abdomens, HNHM); 2♀, Tibet, Batang, Im Tal des Yangtze (*ca.* 2800 m), 5, 6.iv.1936, H. Höne, Vojnits slides nos 10878♀, 10902♀ (HNHM). – Holotype of *E. producta* ♀, N **India**, Kumaon Bhimtal (Nainital), 1450 m, 23.ix.1973, Lichtfang, leg. S. Richter, Vojnits slide no. 12124♀ (SMNK). – Paratype of *E. producta*: 1♀, same locality, 6.ix.1973, Lichtfang, leg. S. Richter, Vojnits slide no. 12127♀ (HNHM). E **Afghanistan**: 1♂, Nurisan-Bashgal, 19 km E of Kamu, 1500 m, 20.x.1970, Nr. 1139, leg. C. Naumann E-lep 209 (SMNK).

A single small Afghanian specimen of the second or third generation is damaged (without right hindwing and abdomen). The pattern on the forewings is characteristic for *E. vivida.* It is a new species for the fauna of this country.

Eupithecia infecunda Vojnits, 1981 **Fig. 8**

Eupithecia infecunda Vojnits, 1981: Annales Historico-Naturales Musei Nationalis Hungarici **73**: 225, fig. 5. Holotype ♀ (SMNK), Pakistan (west): Swat, Kalam, 2000 m.

Material. Holotype ♀, W **Pakistan**, Swat, Kalam, 2000 m, 9.vii.1969, leg. G. Ebert, Vojnits slide no. 12091♀ (SMNK). SE **Afghanistan**: 2♀, Safed Koh, S-Seite, Kotkai, 2350 m, 1–10.viii.1966, 5.ix.1967, M. Müller leg., Vojnits slides respectively nos 16978♀, 19526♀ (SMNK).

This little-known and rare Asian species was described on the basis of a single female from the western Pakistanian province Swat. Two Afghanian specimens are worn but with well-visible distinctive postmedial transverse lines on all wings. The male of *E. infecunda* is unknown.

Eupithecia incurvaria Hampson, 1903 **Fig. 24**

Eupithecia incurvaria Hampson, 1903: Journal of the Bombay Natural History Society **14** (4): 643. Syntypes 2♀ (BMNH), [India]: Kashmir: Goorais Valley.

Eupithecia propoxydata Schütze, 1961: Veröffentlichungen der zoologischen Staatssammlung München **6**: 182, pl. 29, fig. 5; pl. 32, figs 2, 2a, 2b. Holotype ♂ (ZSM), Nepal: Manangbhot, 28°40'N, 84°01'E, Sabzi-Chu, 3500 m (synonymised in Mironov et al. 2008b).

Material. Syntypes: 2♀, **India**, Goorais Valley, June 1887, J. H. Leech, Leech Coll. 1900–64, one (without abdomen) labeled *Eupithecia incurvaria* Hmpsn. type ♂ (*sic*) (BMNH). – Holotype of *E. propoxydata* ♂, **Nepal**, Manangbhot, 28°40'n.Br. 84°1'ö.L., Sabzi-Chu, 3500 m, 9.vii.1955, leg. F. Lobbichler, Zoolog. Staatsslg., *propoxydata* Schü. Holotypus. Präp. № A704♂ det. E. Schütze, Kassel, ZSM G13366, photo 84 B 30 det. A. Vojnits (ZSM). SE **Afghanistan**: 3♂, 4♀, Safed Koh, S-Seite, Kotkai, 2350 m, 14–23.vi.1966, 21.vi–1.vii.1969, G. Ebert leg., Vojnits slides nos 16958♂, 17547♂, 17552♂, 17546♀, 17551♀, 17553♀, 19491♀; 4♀, same locality, 20–25.vi.1967, 16.vi.1968, M. Müller leg., Vojnits slides nos 17559♀, 17560♀; 1♂, E Afghanistan, Nurisan-Bashgal, vic. Barg-e-Matal, 2200 m, Flussaue, 16.vii.1970, Nr. 1125, leg. C. Naumann E-lep 209, Ratzel slide no. GU24911/7m (SMNK).

This species was originally described by Hampson on the basis of two females from Kashmir. It is found in northern Pakistan, Jammu & Kashmir, Nepal, and India (Sikkim) ranging from about 1400 m up to about 3500 m above sea-level. A new species for the fauna of Afghanistan. The male genitalia were described and illustrated in Schütze (1961a) as *E. propoxydata*. The female genitalia are described and illustrated for the first time here.

Female genitalia (Fig. 24). Bursa copulatrix small, rounded, almost completely covered with slim spines; marginal spines longer than other. Ductus bursae broad, sclerotized, sharply tapering to colliculum, spineless, but with longitudinal wrinkles. Ductus seminalis broad, membranous, with some small dentates on the inside. Colliculum collar-like, short and narrow. Antrum bowl-shaped, heavily sclerotized, broad and relatively short. Tergite A8 broad, rectangular. Anterior apophyses very short, slightly broadened and flattened at apices; posterior apophyses narrow, medium-sized. Papillae anales relatively small, short, rounded.

Eupithecia innotata (Hufnafel, 1767)

Phalaena innotata Hufnagel, 1767: Berliner Magazin **4** (6): 616. Syntype(s) lost, [Germany]: Berlin region.

Material. **Afghanistan**: 1♂, 3♀, Kabul, K.-e.-char, 30.iv.1970, leg. C. Naumann E-lep 209, prep. Ratzel 2008, Ratzel slides nos GU9408/1w, GU9408/2w, GU9408/3w (SMNK).

A very common West Palaearctic species ranging from Spain in the west to western Siberia in the east. However, it has not been previously recorded from Afghanistan or Central Asia on the whole.

Eupithecia parallelaria Bohatsch, 1893

[*Eupithecia*] *unedonata* var. *parallelaria* Bohatsch, 1893: Deutsche entomologische Zeitschrift, Iris **6** (1): 22. Lectotype ♀ (designated by Vojnits, coll. R. Püngeler in MNHU), locality not designated for lectotype.

Misidentification: *Eupithecia unedonata* f. *famelica* Dietze, 1910 (1♀ paralectotype in coll. K. Dietze in MNHU); *Eupithecia mystica* Vojnits, 1988 (nec *Eupithecia gemellata* f. *mystica* Dietze, 1910) (at least 3♀ paratypes from Turkmenistan in ZISP).

Material. Lectotype (designated by Vojnits) ♀, Type ♀: Iris 1893, v. *parallelaria* Bohatsch, Origin., Zool. Mus. Berlin, Vojnits slide no. 13574♀ (coll. R. Püngeler in MNHU). E **Afghanistan**: 1♂, Nuristan, Bashgal, 18 km E of Kamu, 1500 m, 29.70[sic!].1970, leg. C. Naumann, Coll. Nr. 1147, Ratzel slide no. GU25408/5m; 1♂, Sarobi, 18.x.1957, Frau Dr. Wegner leg.; 3♂, 2♀, same locality, 15., 22.x, 5., 13.xi.1961, ML, Ratzel slides nos GU13408/2m, GU13408/3m (SMNK); 1♀, same locality, 19.x.1961 (ZSM).

There is a series of small specimens of the second generation in the Afghanian material in SMNK and ZSM. A new species for the fauna of Afghanistan. The male and female genitalia were described and illustrated by Vojnits (1988).

Eupithecia praesignata Bohatsch, 1893

[*Eupithecia*] *praesignata* Bohatsch, 1893: Deutsche entomologische Zeitschrift, Iris **6** (1): 21. Lectotype ♀ (designated by Vojnits, coll. O. Staudinger in MNHU), [Central Asia]: type locality not designated [Replacement name for *Eupithecia insignata* Bohatsch, 1893].

[*Eupithecia*] *insignata* Bohatsch, 1893: Deutsche entomologische Zeitschrift, Iris **6** (1): 21 [Junior second ary homonym of *Phalaena Geometra insignata* Hübner, 1789].

Misidentification: *Eupithecia parallelaria* Bohatsch, 1893 (2♂ paralectotypes in coll. O. Staudinger in MNHU).

Material. Lectotype (designated by Vojnits) ♀, Type ♀, Iris 93 *praesignata* Btoch, 55., Origin., Zool. Mus. Berlin, Vojnits slide no. 13571♀ (coll. O. Staudinger in MNHU). – Paralectotype: 1♂, **Kyrgyzstan**, Jssyk-Kul, *innotata* form: *praesignata* Boh., Jssyk-Kul (In Coll. Staudgr. Typen unter sich verschieben), Zool. Mus. Berlin, Vojnits slide no. 13545♂ (coll. K. Dietze in MNHU). NE **Afghanistan**: 5♂, 5♀, Wakhan-Tal, 3300 m, Zemestani Baharak, 10, 23, 24.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242, 261, 262, Ratzel slides nos GU13408/5m, GU18208/5w; 4♀, same locality, 3450 m, Darrah-e-Shaur, 25.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 263; 2♀, same locality, 3400 m, Kotal-e-Dalez, W-Seite, 27.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 269 (SMNK).

This Central Asian species was previously known from Uzbekistan, Tajikistan, Kyrgyzstan, north-western China (Xinjiang), Jammu & Kashmir, and India (Ladakh Mts.), and is new for Afghanistan. The habitus was illustrated in Dietze (1910). The male and female genitalia were described and illustrated in Vojnits (1982b).

Eupithecia mitigata Dietze, 1906

[*Eupithecia*] *mitigata* Dietze, 1906: Deutsche entomologische Zeitschrift, Iris **19** (2): pl. 2, figs 18, 19; ibidem (1908), **21** (2): 168. Lectotype ♂ (designated by Vojnits, coll. R. Püngeler in MNHU), [China]: Lob-Noor.

Misidentification: *Eupithecia omnigera*: *sensu* Vojnits 1988 (*nec* Vojnits 1982b) (at least 1♂ in ZISP).

Material. Lectotype (designated by Vojnits) ♂, Asia centr., **China**, Lob-Noor, E. Mai 1904 Rückbeil sen. 4/05 v. Tancré, *mitigata* cotype, K. Dietze, Zool. Mus. Berlin, Vojnits slide no. 13587♂ (coll. R.

Püngeler in MNHU). – Paralectotypes: 2♂, same data, *mitigata* cotype, K. Dietze (coll. R. Püngeler in MNHU); 1♂, *mitigata* n. sp. ♂, Type, Lob-noor, Asia centr. (Ende Mai 1904. Rückbeil), K. Dietze, 6., *mitigata* Dtze, präp. Nr. A 827♂, det. E. Schütze, Kassel; 1♂ (*nec* ♀), *mitigata* ♀, Type, Lob-noor, Asia centr., Rückbeil, Ende Mai 1901t., Original., K. Dietze (coll. K. Dietze in MNHU). SE **Afghanistan**: 1♀, Prov. Paktia, 2350 m, Safed Koh, S-Seite, Kotkai, 16–17.vi.1971, UV-Li, Ebert & Naumann; 1♂, 3♀, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 10., 23.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242 and 261, Ratzel slide no. GU13408/4m (SMNK).

A distinctive unicolorous, dark grey species of the *innotata* group, often wings almost without a clear pattern, but usually with light costal blotch between medial and terminal areas. Hitherto recorded from Tajikistan, Kyrgyzstan, southern Kazakhstan, and north-western China (Xinjiang). New species for the fauna of Afghanistan. Adults were illustrated by Dietze (1906, 1910). The male genitalia were described and illustrated by Vojnits (1982b).

Eupithecia tshimganica Viidalepp, 1988

Eupithecia tshimganica Viidalepp, 1988: Fauna pyadenits gor Srednej Azii [Geometridae fauna of the Central Asian mountains]: 113, pl. 2, fig. 12; text-pl. 24, figs 5–8. Holotype ♀ (IAET), Uzbeksk. SSR [Uzbekistan]: Chimgan.

Eupithecia subomnigera Vojnits, 1988 **syn. n.**: Annales Historico-Naturales Musei Nationalis Hungarici **80**: 80, (*nec* pl. 1: 1–2); pl. 3, figs 21–24. Holotype ♂ (ZISP), [Tajikistan]: Pamirs, Schugnanensis Mts, fl. Akmamed dara, 3500 m.

Material. Holotype ♀, **Uzbekistan**, Chimgan, 7 juuni 1979a valguspüük, leg. T. Marnot, Viidalepp slide no. 2621♀ (IAET). – Holotype of *E. subomnigera* ♂, **Tajikistan**, Pamir merid. occid., Mts. Schugnanensis cl. sept., fl. Akmamed Dara, 3600 m, 12.vii.1957, A. Bundel, Vojnits slide no. 17731♂ (ZISP). – Paratype of *E. subomnigera*: 1♀, **Tajikistan**, vic. Stalinabad, Takobskoe gorge, 15.vi.1952, Potopolsky, Vojnits slide no. 17729♀ (ZISP). NE **Afghanistan**: 1♀, Prov. Badakshan, 3000 m, 15 km NE of Baharak, Kotal-e-Zardeu, 30.vi.1971, UV-Li, Ebert & Naumann, coll. Nr. 230 (SMNK).

A distinctive, pale, yellowish or yellow-grey species from the *innotata* group. Some known specimens of this species are without a distinct wing pattern. *E. tshimganica* was previously known from Uzbekistan and Tajikistan. First records for Afghanistan. *E. subomnigera* was synonymised here on the basis of the external similarity of the holotype. There are also additional specimens (males and females) of this species in the collection of ZISP from Tien-Shan Mts.

Eupithecia relaxata Dietze, 1904

[*Eupithecia*] *unedonata* var. *relaxata* Dietze, 1904: Deutsche entomologische Zeitschrift, Iris (1903) **16** (2): 367, pl. 5, fig. 17. Holotype ♀ (coll. K. Dietze in MNHU), Central Asia [Iran]: Schakuh.

[*Eupithecia*] *costisignata* Dietze, 1904: Deutsche entomologische Zeitschrift, Iris (1903) **16** (2): 367, pl. 5, figs 18, 19. Syntypes 11, at least 4♂, 3♀ (coll. K. Dietze and R. Püngeler in MNHU), Central Asia [Iran]: Schakuh; [China]: Korla (synonymised in Mironov et al. 2008c).

Eupithecia pamiri Vojnits, 1988: Annales Historico-Naturales Musei Nationalis Hungarici **80**: 81, pl. 1, figs 3–5; pl. 4, figs 25–28. Holotype ♂ (ZISP), [Tajikistan]: Pamir merid. occid., Schach-Darensis Mts, Seiojdara River, 3250 m (synonymised in Mironov et al. 2008c).

Material. Syntype: ♀, **Iran**, Schakuh, 31.vii.1898, Funke, *costisignata* form. *relaxata*, Typ, Schahkuh ♀, 31.vii.1898, Zool. Mus. Berlin, Typus, Gen.-Unters. Nr. [Schmidt slide no.] Eu 104, Zool. Mus. Berlin (coll. K. Dietze in MNHU). – Syntypes of *E. costisignata*: 1♂, **China**, *costisignata*, *costisignata* Korla, Type ♂, Zool. Mus. Berlin, Typus, *Eupithecia costisignata* ♂, Korea, Type, Prep. № 1659.1 E. De Laever det. 1957; 1♀, *costisignata* Korla, *costisignata* ♀ Typ., Korla, *Eupithecia costisignata* ♀, Kor(e)a, Type, Prep. № 1659.2 E. De Laever det. 1957 (coll. K. Dietze in MNHU). – Syntypes of *E. relaxata* var. *costisignata*: 1♀, **China**, Korla, Sai-chin, 372, *costisignata* [hand writing by Dietze] (coll. K. Dietze in MNHU);

3♂, Asia centr., Saichin-Kette nördl. v. Korla, Rückbeil 1902, *relaxata* var. *costisignata* Dietze, Type (v. R. Tancré 11.02), subspec: *relaxata* var. *costisignata* Original (Dietze), Zool. Mus. Berlin, Vojnits slide no. 13584♂ (coll. R. Püngeler in MNHU). – Holotype of *E. pamiri* ♂, **Tajikistan**, Pamir merid. occid., Mts. Schach-Darensis, Cliv septr., fl. Seidj-Dara, 3250 m, 27.vii.1957, A. Bundel leg., Vojnits slide no. 17686♂ (ZISP). C **Afghanistan**: 2♂, Koh-i-Baba, S-Seite, Panjao, 2650 m, 20–22.vii.1966, G. Ebert leg., Vojnits slides nos 17774♂, 19517♂; 4♂, 3♀, same locality, N-Seite, Band-i-Amir, 2900 m, 24–26.vii.1966, Vojnits slides nos 17767♂, 17786♂, 19499♂, 19516♂ 17765♀, 17770♀, 17787♀; 1♂, 1♀, E Afghanistan, Salang-Pass, N-Seite (Khinjan), 2100 m, 5–11.vii.1966, G. Ebert leg., Vojnits slides nos 17873♂, 19496♀; 6♀, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 1–3., 6, 9.ix.1967, M. Müller leg., Vojnits slides nos 16971♀, 16973♀, 16974♀, 16991♀, 19513♀; 1♀, E Afghanistan, Pr. Kunar, Nuristan, ob(eres) Lindai Sin-Tal, vic. Barg e Matal, Dandizenor Mts., 3100 m, 13–14.vii.1970, leg. Naumann, Coll.-Nr. ZMK 93 (SMNK); 1 ex., Prov. Kadaghan, Salang Paß, Nordseite, 69°L 35°40'B, 11–12.vii.1971, leg. Vartian (HNHM); 6♂, 30 ♀, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 10, 23, 24.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242, 261, 262, Ratzel slide no. GU31209/3w; 1♂, 9♀, same locality, 3450 m, Darrah-e-Shaur, 25.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 263; 3♂, 19♀, same locality, 3400 m, Kotal-e-Dalez, W-Seite, 27., 29.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 269 and 272; 7♂, 1♀, same locality, Sargaz, 2930 m, 11.viii.1971, UV-Li, Ebert & Naumann, coll. Nr. 290 (SMNK).

This handsome, distinctive and common Central Asian species of the *innotata* group is distributed in Turkmenistan (Kopet-Dagh Mts.), Iran, Tajikistan (Pamirs Mts.), Kazakhstan, Kyrgyzstan (Tien-Shan Mts.), Pakistan (Baltistan), Jammu & Kashmir, India (Ladakh Range), north-western China (Xinjiang), and Mongolia (Mongol Altai Mts.). First records for Afghanistan. It is a bivoltine species with the second generation being smaller than the first. The larvae of *E. relaxata* have been found in scrub woodland on *Amygdalus spartioides* (Rosaceae) in Iran (Wiltshire 1952). The male and female genitalia were described and illustrated in De Laever (1960) for the first time as *E. costisignata*. Later on, Vojnits (1982b) described and illustrated the male and female genitalia of this species also under the name *E. costisignata* but without the eighth sternite of the males. He described this species as a new one under the name *pamiri* again in another publication (Vojnits 1988).

Eupithecia lindti Viidalepp, 1988

Eupithecia lindti Viidalepp, 1988: Fauna pyadenits gor Srednej Azii [Geometridae fauna of the Central Asian mountains]: 113, pl. 1, fig. 16; text-pl. 24, figs 1–4. Holotype ♂ (IAET), Uzb. SSR [Uzbekistan]: Chimgan spa.

Eupithecia hangayorum Vojnits, 1988: Annales Historico-Naturales Musei Nationalis Hungarici **80**: 84, pl. 1, figs 1–2 (*nec* pl. 2, figs 15–16); pl. 6, figs 45–48. Holotype ♂ (ZISP), [Tajikistan]: Darwaz occid., Chazret-scho Mts, fl. Don Duschlan, 2200 m (synonymised in Mironov et al. 2008c).

Material. Holotype ♂, **Uzbekistan**, kur. Chimgan, 26.vi–1.vii.1981, at light, leg. A. Lindt (IAET). – Holotype of *E. hangayorum* [*hangayae* on the label] ♂, **Tajikistan**, Darwaz occid., Mts, Chazreti-Scho, fl. Don Duschkan, 25.vii.1959, 2200 m, leg. A. A. Bundel, Vojnits slide no. 17748♂ (ZISP). – Paratypes of *E. hangayorum* [*hangayae* on the label]: 1♀, **Tajikistan**, Mts. Darwaz, cliv. Merid., fl. Wischarvi, 1800 m, 3.viii.1958, A. Bundel, Vojnits slide no. 17691♀; 1♀, Pamir occid., fl. Obi-Chingou, Mionadu, 6.viii.1959, 2200 m, A. Bundel, Vojnits slide no. 17674♀; 1♂, 1♀, vic. Stalinabad, Khorangonskoe gorge, 12.viii.1951, Vojnits slides nos 17629♀, 17638♂; 1♂, vic. Dzhirgatal, Dzhul-Terek Pass, 2400 m, 13.vii.1953, Bundel, Vojnits slide no. 17671♂ (ZISP). **Afghanistan**: 1♂, Pagman-Gebirge (Kabul), ca. 3000 m, Juni–Juli 1942, coll. Brandt, R. M. prep. 4914, 7467 E94+, *Eup. afghanata* Schü., Präp. Nr. S 1205♂ det. E. Schütze, Kassel, Holotypus *Eup. afghanata* Schütze (undescribed), ♂, E. Schütze, Kassel, Naturhistoriska Riksmuseet Stockholm, Loan no 361/06; 1♂, same data, R. M. prep. 4915, 7468 E94+, *E. afghanata* Schü., Präp. Nr. S 1222♂ det. E. Schütze, Kassel, Paratypus *Eupith. afghanata* Schütze, ♂, E. Schütze, Kassel, Naturhistoriska Riksmuseet Stockholm, Loan no 362/06 (NHRS); 1♂, same data, 100/57, R. M. prep. 4905, 7469 E94+, spec. ?, *Eup. kabulata* Schü., Präp. Nr. S 1204♂ det. E. Schütze, Kassel, Holotypus *Eupith. kabulata* Schü. (undescribed), E. Schütze, Kassel, Naturhistoriska Riksmuseet

Stockholm, Loan no 363/06; 1♂, same data, R. M. prep. 4906, 7470 E94+, *Eup. kabulata* Schü., Präp. Nr. S 1206♂ det. E. Schütze, Kassel, Paratypus *Eup. kabulata* Schütze, E. Schütze, Kassel, Naturhistoriska Riksmuseet Stockholm, Loan no 364/06; 1♂, same data, R. M. prep. 4904, 7472 E94+, *E. pagmanata* Schü., Präp. Nr. S 1207♂ det. E. Schütze, Kassel, Monotypus *Eup. pagmanata* Schü. (undescribed), Kassel, Naturhistoriska Riksmuseet Stockholm, Loan no 365/06 (NHRS); 1♂, 3♀, Hazaradjat, Koh-i-Baba, Pandjao Umgeb., 2500 m, 26.vi–1.vii.1961, leg. G. Ebert (ZSM); 4♂, 14♀, E Afghanistan, Salang-Pass, N-Seite (Khinjan), 2100 m, 5–11.vii.1966, G. Ebert leg., Vojnits slides nos 17532♂, 17537♂, 17539♂, 19507♂, 17533♀, 17534♀, 17535♀, 17536♀, 17538♀, 17541♀, 17542♀, 17543♀, 17544♀, 19493♀, 19497♀, 19498♀, 19508♀, 19509♀; 1♀, Kabulfluss, Tamarix-Alhasi-Steppe, 14.vii.1966, Vojnits slide no. 19500♀; 2♂, C Afghanistan, Koh-i-Baba, S-Seite, Panjao, 2650 m, 20–22.vii.1966, G. Ebert leg., Vojnits slides nos 19512♂, 19534♂; 1♂, same locality, N-Seite, Band-i-Amir, 2900 m, 24–26. vii.1966, G. Ebert leg., Vojnits slide no. 19549♂; 1♀, Salang-Nord, 2100 m, vic. Khindjan, 13.vi.1970, leg. Naumann, Nr. 1067, Ratzel slide no. GU25408/6w; 1♂, E Afghanistan, Nuristan, Bashgal, vic. Barg-e-Matal, 3 km W (Seitental), 2500 m, 6.vii.1970, leg. Naumann, Nr. 1106, prep. Ratzel 2008 E-lep 209 (SMNK).

This large species is very similar to the Iranian *E. mahomedana* Brandt, 1938, but is smaller and darker on the whole. Forewings with more pointed apex and almost straight oblique termen; all wings with transverse lines more distinct, almost straight and more oblique, discal dots usually larger and more conspicuous than in *E. mahomedana*. The male genitalia are very similar to those of *E. mahomedana* without any obvious diagnostic differences. The female genitalia can be distinguished from those of *E. mahomedana* by the absence of longitudinal membranous gap dividing in half the main spiniferous area. *E. lindti* was previously known from the mountains of Uzbekistan, Tajikistan, and northern provinces of Pakistan and India. It is a new species for the fauna of Afghanistan.

Eupithecia convallata terricolor Vojnits, 1988

Eupithecia convallata terricolor Vojnits, 1988: Acta Zoologica Hungarica **34** (4): 423, pl. 1, figs 5, 6; text-figs 9–12. Holotype ♂ (coll. Vartian, Vienna), Afgh[anistan]: 10 km NW of Kabul, 1900 m.

Material. Paratype: 1♂, **Afghanistan**, 10 km NW v. Kabul, 1900 m, 29.v.1965, Kasy & Vartian, Vojnits slide no. 15627♂ (HNHM). 9♂, 4♀, E Afghanistan, Sarobi, 1100 m, 7., 15–16., 19., 21., 24–25., 27., 29.iv.1961, leg. G. Ebert, Ratzel slides nos 12312/3m, 12312/6w, 12312/7w, 13312/1w (ZSM).

This species was originally described from Iran by W. Brandt (1938). Later, Vojnits (1988) described a new subspecies *terricolor* from Afghanistan, which can be distinguished from the nominate subspecies by the less developed wing pattern, broader and less wavy basal, ante- and postmedial transverse lines in the forewing, and the presence of a large light blotch along the anal margin in the medial area between ante- and postmedial lines, also a broader and more distinct oblique postmedial transverse line in the hindwing. One female is externally different from the others. It is larger, with distinct discal dots in both pairs of wings and a dark basal area in the forewing. The holotype of this Afghanian subspecies is deposited in the collection Vartian (Vienna) and, unfortunately, we did not have a chance to study it. We have not seeen current material of *E. convallata terricolor* from Afghanistan.

Eupithecia xanthomixta Vojnits, 1988 — Figs 9, 10

Eupithecia xanthomixta Vojnits, 1988: Acta Zoologica Hungarica **34** (4): 428, pl. 2, figs 11, 12; text-figs 21–24. Holotype ♂ (coll. Vartian, Vienna), Afghanistan (east): Khinju, Salang Pass, 2100 m.

Material. Paratypes: 1♂, **Afghanistan**, Khurd-Kabul SE v. Kabul, 1900 m, 26.vi.1965, Kasy & Vartian, Vojnits slide no. 15623♂; 1♀, same locality, 19.vi.1969, leg. Vartian, Vojnits slide no. 15682♀ (HNHM); 3♂, same data, G. Ebert leg., Vojnits slides nos 16967♂, 16968♂, 19530♂; 1♀, same locality, 3.vii.1965, Kasy & Vartian (SMNK); 1♀, E Afghanistan, s. v. Khinjan, Salang Pass, N-Seite, 2100 m, 9.vii.1969, leg. Vartian, Vojnits slide no. 15150♀ (HNHM). 1♂, 2♀, same locality, 5–11.vii.1966, G. Ebert leg., Vojnits slides nos 19529♂, 17870♀, 17871♀; 1♂, Salang-Nord, 2100 m, vic. Khindjan, 13.vi.1970, leg. C. Naumann, Nr. 1067 (SMNK).

A dark, motley, originally coloured and variable species from the *graphata* group which was described on the basis of a relatively large series of specimens. The male and female genitalia were briefly described and badly illustrated (especially the phallus and female genitalia) in Vojnits (1988).

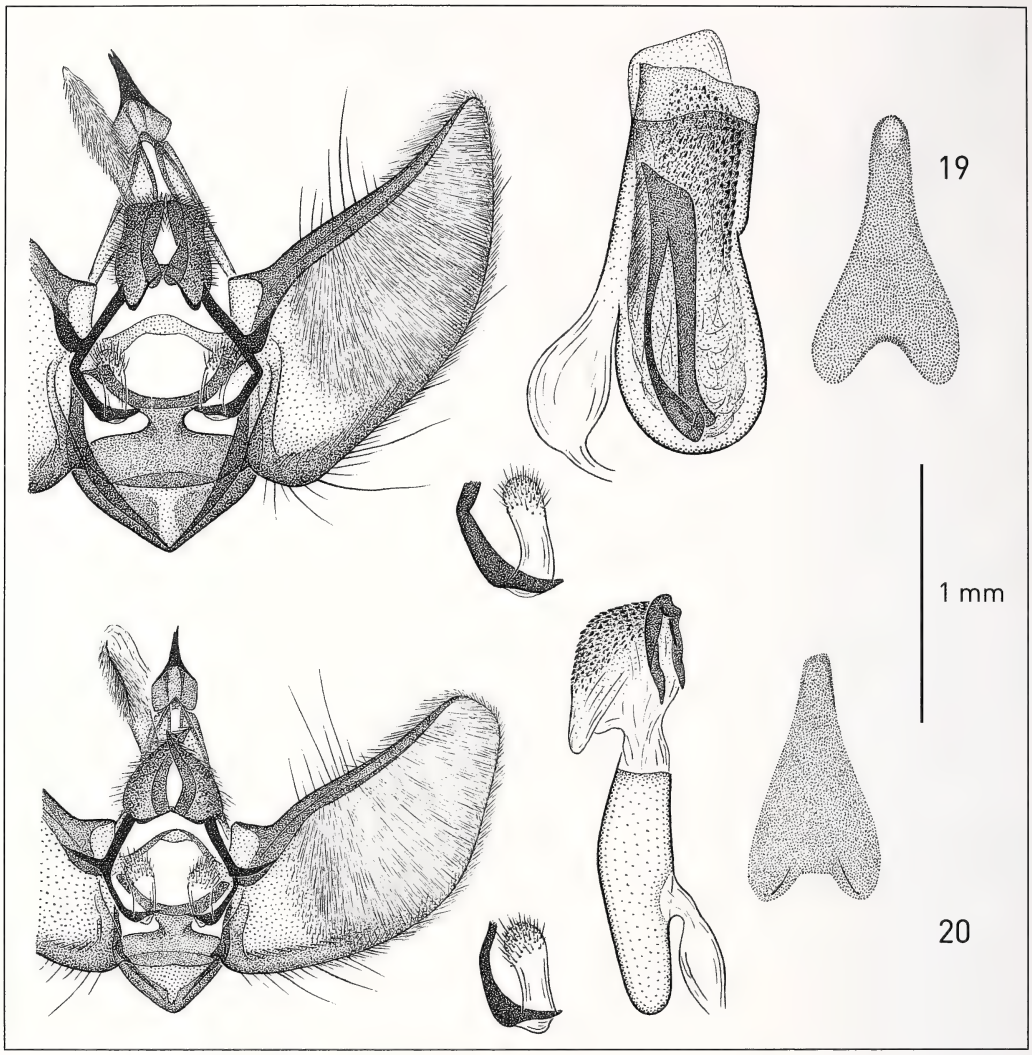
***Eupithecia naumanni* Mironov & Ratzel, sp. n.** **Figs 11, 12, 19, 25**

Material. Holotype ♀, E **Afghanistan**, Nuristan, Bashgal, vic. Barg-e-Matal, 3 km W (Seitental), 2500 m, 6.vii.1970, leg. C. Naumann, Nr. 1106, Ratzel slide no. GU8408/1w (SMNK). – Paratypes: 6♀, same data, Ratzel slide no. GU8408/2w; 1♀, same locality, Dandizenor, 3000 m, 13.vii.1970, Nr. 1122, leg. C. Naumann (SMNK); 2♂, 12♀, same locality, 2200 m, 3–5., 16.vii.1970, Nr. 11 and 1125, leg. C. Naumann E-lep 209, Ratzel slide no. GU9408/6w (SMNK, 4♀ in ZISP); 1♀, Badakhshan, 3500 m, Bala-Kuran loc., 10.vii.2003, local collector leg., Mironov slide no. 863♀ (coll. Skou).

Description. Wingspan 20.5–25.0 mm; length of forewing 11.5–13.5 mm. Labial palpi short and obtuse, length about one half of diameter of eye, covered with light brown scales with grey tips. Frons and vertex covered with mixture of brown and light grey scales. Notum and abdomen with dominant ash grey scales. Forewing rather elongate, with straight costal margin curving near apex, oblique termen and pointed apex; ground colour brownish grey; transverse lines brown; basal and antemedial oblique, sharply angled onto costa; medial line usually oblique, touching discal dot and sharply or right angled from discal dot onto costa; medial area between antemedial and medial lines usually darker than the rest of the wing; postmedial line slightly wavy, evenly curved onto costa; terminal area often darker, especially in apical part; discal dot relatively small, black, rounded or slightly elongated. Hindwing ovoid, similar in colour, transverse lines distinct only along anal margin; terminal area usually slightly darker, with wavy inner border and a series of dark dashes on the veins; discal dot paler, brownish, rounded or slightly elongated and more or less distinct; fringe on all wings chequered pale grey and brownish grey.

Male genitalia (Fig. 19). Uncus medium-sized, rather narrow, biapical. Valve shaped like a segment of orange fruit; dorsal margin slightly arched near base; ventral margin parallel to dorsal at basal half and evenly curved and tapering to apex; apex narrowly rounded; sacculus lightly sclerotized. Vinculum rather narrow and short, tapering anteriorly. Papillae on the anterior arms of the labides medium length and width, slightly curved, covered with short setae at apices. Phallus stout, large and broad, shorter than length of valve. Vesica covered with numerous denticules, larger on one side and armed with a long and narrow, V-shaped, plate-like cornutus typical for the males of the "*graphata*" species-group. Sternite A8 peg-like, elongated, with stronger sclerotized margins near apex; basal emargination relatively broad and deep.

Female genitalia (Fig. 25). Bursa copulatrix large, ovoid-oblong, membranous, about one half covered with slim spines, which are larger posteriorly; the border of



Figs 19–20. Male genitalia of *Eupithecia* species (scale bar = 1 mm: with sternite A8, and papillae on the anterior arms of labides enlarged). **19.** *E. naumanni* Mironov & Ratzel, sp. n. **20.** *E. ochrovittata* Christoph, 1887.

spiniferous area oblique. Ductus bursae tapering to colliculum, heavily sclerotized, with distinct oblique border from corpus bursae and chain of small spines along this border between base of ductus bursae and colliculum. Ductus seminalis broadened in basal part; attached to the middle of corpus bursae at right side. Colliculum collar-like, rather medium-sized, slightly elongated and inclined to one side. Antrum short and broad, membranous. Tergite A8 rectangular, broader than long, with rounded posterior corners. Anterior and posterior apophyses medium length and thickness, tapering to apices. Papillae anales relatively large, broad, rounded, covered with short setae.

Diagnosis. This species belongs to the *graphata* group. It is similar to *E. xanthomixta* Vojnits, 1988, but the new species is usually larger, ground colour pale greyish brown,

wing pattern less distinct, postmedial transverse line more evenly curved near costa and not bordered by blackish shading, hindwing darker with indistinct transverse lines. The male and female genitalia are very similar to those of *E. xanthomixta*. The male genitalia can be distinguished by the larger valva with more arched dorsal margin and broader apex than in *E. xanthomixta*. The female genitalia of these two species appear identical.

Distribution. East Afghanistan.

Etymology. This species is named in honour of the German zoologist and lepidopterologist Prof. Dr. Clas Naumann (1939–2004), the former Director of the "Zoologisches Forschungsinstitut und Museum Alexander Koenig", Bonn, Germany (ZFMK). Many times he visited Afghanistan and collected most part of the type series of this new species *Eupithecia naumanni*.

Remarks. Unfortunately, the majority of paratypes of this species are very worn. We believe that the *graphata* group includs mainly recently-diverged species because the male and female genitalia of many species in this group are very similar. Some species of the *graphata* group can be distinguished from each other by external features only, such as ground colour and wing pattern (Schütze 1958).

Eupithecia simpliciata (Haworth, 1809)

Phalaena simpliciata Haworth, 1809: Lepidoptera Britannica (**2**): 359. Syntype(s) (BMNH ?), [Great Britain].

[*Geometra*] *subnotata* Hübner, 1813: Sammlung Europäischer Schmetterlinge **5** Geometrae (2), pl. 89, fig. 458. Syntype(s) lost, [Europe] (synonymised in Herrich-Schäffer 1848; as *Eupithecia subnotataria* [sic] (Hübner, 1813).

Eupithecia subnotata f. *collustrata* Dietze, 1911: Biologie der Eupithecien **1**: pl. 85, fig. 947; ibidem (1913) **2**: 107. Syntypes 2♂, 3♀ (coll. K. Dietze in MNHU), [Kyrgyzstan]: Karagai-tau; Naryn; [China]: Altyn-dagh.

Misidentification: *Eupithecia inculta*: sensu Viidalepp 1988 (*nec* Vojnits 1975).

Material. Syntype of *Eupithecia subnotata* f. *collustrata*: 1♀, **Kyrgyzstan**, Karagai tau, *subnotata* v. *collustrata* v. *issyka* Bang-Hs., Karagai tau (coll. K. Dietze in MNHU). **Afghanistan**: 1♂, Nuristan, 25 km N. v. Barikot, 1800 m, 12–17.vii.1963, Kasy & Vartian (HNHM); 2♂, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 24.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 262 (SMNK).

This is a widespread species, ranging from Western Europe to northwestern China (Xinjiang) from close to sea level to about 3300–3400 m above sea-level in Tajikistan (Viidalepp 1988, as *E. inculta*) and Afghanistan from where it was not hitherto known until now.

Remarks. The widely used names for this species (*E. simpliciata* and *E. subnotata*) were used as two bona species in "Geometrid Moths of the World: A catalogue (Lepidoptera, Geometridae)" by Scoble et al. (1999) despite the very old synonymisation of these taxa by Herrich-Schäffer (1848).

Eupithecia centaureata (Denis & Schiffermüller, 1775)

Geometra centaureata Denis & Schiffermüller, 1775: Systematisches Verzeichnis Schmetterlinge, Wien: 114. Syntype(s) lost, [Austria]: Vienna district.

Eupithecia oblongata var. *centralisata* Staudinger, 1892: Deutsche entomologische Zeitschrift , Iris **5** (1): 250. Syntypes 13, at least 5♂, 6♀ (coll. O. Staudinger in MNHU), Central Asia: [Uzbekistan]: Margelan; Namangan; Samarkand; [Kyrgyzstan]: Alexander Mts.; [Kazakhstan]: Saisan.

Eup[*ithecia*] *oblongata* f. *obscura* Dietze, 1910: Biologie der Eupithecien **1**: pl. 70, fig. 132; ibidem (1913), **2**: 63. Syntypes 6, at least 4♀ (coll. K. Dietze in MNHU), [Kyrgyzstan]: Alai Mts.; [Kazakhstan]: Uralsk; [Italy]: southern Tyrol.

Eupithecia centaureata dagestani Vojnits, 1977: Acta Zoologica Academiae Scientiarum Hungaricae **23** (1–2): 229, fig. 2. Holotype ♂ (ZFMK), [Russia]: Dag(h)estan, Petrovsk-port [= Makhachkala].

Eupithecia centaureata dsharkendi Vojnits, 1977: Acta Zoologica Academiae Scientiarum Hungaricae **23** (1–2): 230, fig. 3. Holotype ♀ (ZFMK), [Kazakhstan]: Dsharkend, Semiretschensk.

Eupithecia chinae Vojnits, 1977: Acta Zoologica Academiae Scientiarum Hungaricae **23** (1–2): 231, figs 4, 5b.

Holotype ♂ (ZFMK, now in HNHM), China: Shantung Province, Tai-shan, 1550 m (synonymised in Mironov & Galsworthy 2007).

Material. Syntypes of *E. centaureata* f. *obscura*: 1♀, **Kyrgyzstan**, *oblongata* forma: *obscura* typ, Alai mont.; 1♀, Alai mont. 1905 Korb, 25.vii.1905, *oblongata* ab. *obscur.* Dietze (coll. K. Dietze in MNHU). – Holotype of *E. centaureata dagestani* ♂, **Russia**, Dagestan, Petrovsk-port, 29.v.1926, M. Rjabov, Vojnits slide no. 743♂ (ZFMK). – Holotype of *E. centaureata dsharkendi* ♀, **Kazakhstan**, Dsharkend, Semiretschensk, Vojnits slide no. 1110♀ (ZFMK). – Holotype of *E. chinae* ♂, **China**, Tai-shan (1550 m), Prov. Shantung, 16.viii.1934, H. Höne, Vojnits slide no. 1103♂ (ZFMK). – Paratypes of *E. chinae*: 1♀, same locality, 11.viii.1934, H. Höne, De Laever slide no. 424♀; 1♀, Harbin, (Manchuria), Juni 1923, V. Tolmachov, Vojnits slide no. 1101♀ (HNHM). E **Afghanistan**: 1♀, Nurisan-Bashgal, vic. Barg-e-Matal, 2200 m, Flussaue, 16.vii.1970, Nr. 1125, leg. C. Naumann, E-lep 209; 1♂, NE Afghanistan, Prov. Badakhshan, 1750 m, 12 km NE of Baharak, Pejuj, 27.vi.1971, UV-Li, Ebert & Naumann, coll. Nr. 224; 1♂, same locality, 3000 m, 15 km NE of Baharak, Kotal-e-Zardeu, 30.vi.1971, UV-Li, Ebert & Naumann, coll. Nr. 230 (SMNK).

This is one of the most easily recognizable species among the Palaearctic representatives of the genus. The male and female genitalia were described and illustrated in Petersen (1910) for the first time and in many other publications later.

E. centaureata is a widespread and relatively common species, it ranges from the Atlantic coast of Ireland, Portugal, and Morocco across Europe and the greater part of Asia to the Far East of Russia (Priamurje) and the Pacific coast of the Chinese province Guangdong, as well as Taiwan. It had not been recorded for the fauna of Afghanistan until now.

Eupithecia nachadira Brandt, 1941 — Fig. 13

Eupithecia nachadira Brandt, 1941: Mitteilungen der Münchner entomologischen Gesellchaft **31** (3): 877, pl. 29, fig. 23. Lectotype ♂ (designated in Mironov 2003; NHRS), [Iran]: Kouh i Taftan, 2500–2800 m.

Material. Lectotype ♂, **Iran**, Baloutchistan, Kouch i Taftan (Khach), 2800 m, 30 Mai 1938, Coll. Brandt, 32/88, Riksmuseum Stockholm, Mironov slide no. 869♂, Illustrated in GME vol. 4, Mironov: Larentiinae II (NHRS). – Paralectotypes: 3♂, 1♀, same data, Schmidt slide no. Eu 133♀ (in ZFMK), Vojnits slides nos. 625♂, 637♂ (in HNHM), Mironov slide no. 871♂ (in NHRS) (NHRS); 1♀, same locality, 1 Juni 1938, Coll. Brandt, 35, *E. nachadira* Brdt.; 1♂, same locality, 2500 m, 30 Apr. 1938, Coll. Brandt, 94/57, *nachadira* Brdt., 34, photo 25 F 80 det. A. Vojnits [without abdomen] (NHRS); 1♂, same locality, 12 Mai 1938, Coll. Brandt, 43c, *Eupithecia nachadira* Brandt, det. D. S. Fletcher, see W.B. XII list, L.B. Prout Coll., B.M. 1939–643 (BMNH). C **Afghanistan**: 7♀, Koh-i-Baba, S-Seite, Panjao, 2650 m, 20–22.vii.1966, G. Ebert leg., Vojnits slides nos 17776♀, 17777♀, 17778♀, 17781♀, 17782♀, 17783♀, 19555♀ (SMNK).

E. nachadira was described and hitherto only recorded from Iran. It belongs to the *centaureata* group and was not previously recorded from Afghanistan. The male genitalia were described and illustrated in Mironov (2003) for the first time.

Remarks. The type specimens of *E. nachadira* were not designated by Brandt with labels "holotype" and "paratype". In addition, all syntypes mentioned above are without abdomens and only two have information about genitalia slides made by Vojnits.

Eupithecia repetita Vojnits, 1981

Eupithecia repetita Vojnits, 1981: Annales Historico-Naturales Musei Nationalis Hungarici **73**: 225, figs 7, 8. Holotype ♂ (SMNK), Pakistan (west): Swat, Kalam, 2000 m.

Material. Holotype ♂, W **Pakistan**, Swat, Kalam, 2000 m, 9.vii.1969, leg. G. Ebert, Vojnits slide no. 12105♂ (SMNK). – Paratypes: 1♂, 2♀, same data, Vojnits slides nos 12114♂, 12107♀, 12118♀ (SMNK); 1♂, 1♀, same data, Vojnits slides nos 12116♂, 12109♀ (HNHM); 1♂, 5♀, same locality, N. v. Kalam, Gabral-Tal, 2100 m, 6–9.vii.1969, leg. G. Ebert, Vojnits slides nos 12104♂, 12112♀, 12106♀, 12111♀, 12115♀, 12117♀ (SMNK). SE **Afghanistan**: 2♀, Safed Koh, S-Seite, Kotkai, 2350 m, 9.vii, 13.viii.1968, M. Müller leg., Vojnits slides nos 19554♀, 16954♀ (SMNK).

It was not surprising that this species occurs in Afghanistan, because it was described from the western provinces of Pakistan. According to the structure of the male and female genitalia (Vojnits 1981), it is a representative of the *centaureata* group with striking external appearance. The holotype of *E. repetita* was illustrated by Mironov et al. (2008c) for the first time.

Eupithecia subtilis Dietze, 1910

Eup[*ithecia*] *staudingeri* f. *subtilis* Dietze, 1910: Biologie der Eupithecien **1**: pl. 79, figs 870, 871; pl. 80, fig. 900. Lectotype ♀ (designated in Mironov et al. 2008c, coll. K. Dietze in MNHU), Hyrcan(ia) [Iran]: Schahkuh.

Eupithecia tonu Viidalepp, 1988: Fauna pyadenits gor Srednej Azii [Geometridae fauna of the Central Asian mountains]: 118, pl. 2, fig. 16; text-pl. 26, fig. 1. Holotype ♀ (IAET), Tadzh. SSR [Tajikistan]: South-western Alai, Dzhirgatal, 1700 m (synonymised in Mironov et al. 2008c).

Material. Lectotype ♀, **Iran**, *subtilis* Dietze ?*staudingeri*-Form., Schahkuh Typ., 105., n. spec. ♀, cf. Dietze Iris 19. T. 1, Iris XIX, Taf. 1, fig.15, durch Petersen (coll. Dietze in MNHU). – Paratypes of *E. tonu* [*toenui* on the label]. 1♀, **Uzbekistan**, Usbeki NSU, Tšimgan, 29.vi.1981 (IAET). 1♂ (*nec* ♀), **Tajikistan**, Ferghana, Schakhimardan, 1550 m, 17.vii.1952, Bundel, 29. 1♀, **Kyrgyzstan**, Alajsky Mts., northern slope, vic. Sufi-Kurgan, Terek, 2300 m, 15.vii.1968, Bundel, 60, Viidalepp slide no. 2362♀, ZISP microprep. № 17091 (ZISP). **Afghanistan**: 1♀, Paghman, 30 km NW v. Kabul, 2100 m, 20–30. vii.1962, E. & A. Vartian leg., Vojnits slide no. 17428♀; 1♀, same locality, 2200 m, 29.vi–8.vii.1963, Kasy & Vartian, Vojnits slide no. 17387♀ (HNHM); 3♀, C Afghanistan, Koh-i-Baba, N-Seite, Band-i-Amir, 2900 m, 24–26.vii.1966, G. Ebert leg., Vojnits slides nos 19547♀, 19548♀, 19550♀; 1♀, E Afghanistan, Nurisan-Bashgal, vic. Barg-e-Matal, 2200 m, prep. Ratzel 2008, E-lep 209 (SMNK).

This is a representative of the *centaureata* species-group. *E. subtilis* is known from Iran, Uzbekistan, Kyrgyzstan, Tajikistan, and Pakistan. It occurs in from about 1500 m up to about 3500 m above sea-level. A new species for the fauna of Afghanistan. The female genitalia were described and illustrated in Viidalepp (1988) as *E. tonu*. The male genitalia of *E. subtilis* will be described in our forthcoming paper treating material from Tajikistan and Iran.

Eupithecia egregiata Mironov & Ratzel, 2008

Eupithecia egregiata Mironov & Ratzel, 2008: Transactions of the Lepidopterological Society of Japan **59** (3): 214, figs 10, 18, 22. Holotype ♂ (HNHM), Pakistan (north-west): Prov. Swat, Gabral-Tal, 15 km northern Kalam, 2100 m.

Material. Holotype ♂, NW **Pakistan**, Prov. Swat, Gabral-Tal, 15 km N of Kalam, 2100 m, 6–9. vii.1969, leg. Vartian, Vojnits slide no. 15674♂ (HNHM). – Paratypes: 1♀, same data, Vojnits slide no. 15132♀; 1♀, same data, but leg. G. Ebert, Vojnits slide no. 12108♀ (HNHM); 1♀, Great West. Himalaya Mts., near Gabar, 3200 m, 21–24.viii.2004, leg. V. Gurko, Ratzel slide no. GU1905/5w (coll. Ratzel). SE **Afghanistan**: 1♀, Safed Koh, S-Seite, Kotkai, 2350 m, 25.vii.1968, M. Müller leg., Vojnits slide no. 19368♀ (HNHM).

This species from the *centaureata* group was described on the base of a small series of specimens (one male holotype and four female paratypes) from Pakistan and Afghanistan (one female). We have not seen additional material of this species from Afghanistan.

Eupithecia decipiens Petersen, 1910 **Fig. 14**

E[*upithecia*] *decipiens* Petersen, 1910: Deutsche entomologische Zeitschrift, Iris **22** (4): 279, pl. 26, fig. 104. Syntypes ♂, ♀ (coll. K. Dietze in MNHU), [Iran]: Schahkuh.

Material. Syntype 1 ex. [without antennae and abdomen]: **Iran**, *decipiens* Peters., Schahkuh. Typ., K. Dietze, *decipiens*, Zool. Mus. Berlin (coll. K. Dietze in MNHU). C **Afghanistan**: 1♂, Koh-i-Baba, N-Seite, Band-i-Amir, 2900 m, 24–26.vii.1966, G. Ebert leg., Vojnits slide no. 19531♂ (SMNK).

E. decipiens is a little-known and rare Asian species which was described from northern Iran and previously known only from Iran, Uzbekistan (coll. IAET), and Kyrgyzstan (Viidalepp 1988), occuring from about 1500 m up to about 2900 m above sea-level. This is a new species for the fauna of Afghanistan.

This species is unlikely to be confused with any other Asian representative of the genus. The triangular forewings with almost straight margins, narrow apex and distinctive dark, oblique, narrow medial band between antemedial and medial transverse lines, which is sharply angled from R vein onto costa, make this an easy species to identify. According to the structure of the male and female genitalia this species belongs to the *centaureata* group. The details of the male and female genitalia were described and illustrated in Petersen (1910).

Eupithecia mekrana Brandt, 1941

Eupithecia mekrana Brandt, 1941: Mitteilungen der Münchner entomologischen Gesellchaft **31** (3): 877, pl. 29, fig. 24. Lectotype ♂ (designated in Mironov 2003, NHRS), [Iran]: Baloutchistan, Bender Tchahbahar.

Eupithecia mekrana khorassana Brandt, 1941: Mitteilungen der Münchner entomologischen Gesellchaft **31** (3): 877. Lectotype ♂ (designated in Mironov 2003, NHRS), [Iran]: Khorassan, Kouh i Binaloud (Meched), 2500 m.

Eupithecia idonea Vojnits, 1982: Acta Zoologica Academiae Scientiarum Hungaricae **28** (3–4): 412, figs 12, 13. Holotype ♂ (HNHM), Armenia: Migry near Araks (synonymised in Mironov 1991).

Eupithecia stulta Vojnits, 1982: Acta Zoologica Academiae Scientiarum Hungaricae **28** (3–4): 413, fig. 14. Holotype ♂ (HNHM), Armen(ia): St(ation) Negram near Araks (synonymised in Mironov 1991).

Eupithecia commenticia Vojnits, 1982: Acta Zoologica Academiae Scientiarum Hungaricae **28** (3–4): 414, figs 15, 17. Holotype ♂ (HNHM), Armenia: Migry near Araks (synonymised in Mironov 1991).

Eupithecia mekrana amiralis Wiltshire, 1986: *in* Büttiker & Krupp, Fauna of Saudi Arabia **8**: 280, fig. 102, gen. figs 18, 19. Holotype ♂ (BMNH), [Saudi Arabia]: UAE ("Trucial Oman"), Masafi.

Material. Lectotype ♂, **Iran**, Baloutchistan, Bender Tchahbahar, 3 Februar 1938, Coll. Brandt, 82/57, *graciliata* Dtze., *mekrana* Brdt., 30/88, Riksmuseum Stockholm, Mironov slide no. 867♂ (NHRS). – Paralectotypes: 1♂, same locality, 22 Januar 1938, Coll. Brandt, *graciliata* Dtze., 29/88, Riksmuseum Stockholm, Mironov slide no. 868♂ (NHRS); 2♂, same locality, 24 Januar 1938, Coll. Brandt, *graciliata* Dtze., 42 and 16, photo 24 F 80 det. A. Vojnits (both specimens without abdomens, NHRS); 1♂, same locality, Januar 1938, Coll. Brandt, *Eupithecia graciliata* Dietze ♂ ?, W.B. XI 33A, Preparation W.B. M. 416 (BMNH). – Lectotype of *E. mekrana khorassana* ♂, **Iran**, Khorassan, Kouh i Binaloud (Meched), 2500 m, 5 Aug. 1938, Coll. Brandt (NHRS). – Paralectotype of *E. mekrana khorassana*: 1♀, same data, Coll. Brandt, 40, 25 (NHRS). – Holotype of *E. idonea* ♂, **Armenia**, Megry na Araxe, Rjabov, 29.viii.1932, 39/77, Vojnits slide no. 13656♂ (HNHM). – Paratype of *E. idonea*: 1♀, **Armenia**, Transkauk., fl. Arax, st. Darasham I, 25.viii.932, Rjabov, 39/70, Vojnits slide no. 13663♀ (HNHM). – Holotype of *E. stulta* ♂, **Armenia,** St. Negram na Araxe, Rjabov, 19.v.1934, 39/81, Vojnits slide no. 13657♂ (HNHM). – Holotype

of *E. commenticia* ♂, **Armenia**, Megry na Araxe, Rjabov, 29.viii.1932, 39/74, Vojnits slide no. 13655♂ (HNHM). – Paratype of *E. commenticia*: 1♀, **Armenia**, Russ. Armen., Migry, M. Rjabov, 29.viii.1932, 39/68, Vojnits slide no. 13650♀ (HNHM). – Paratype of *E. mekrana amiralis*: 1♀, Trucial **Oman**, Masafi, 22–24.ii.1971, M. D. Gallagher, *Eupithecia mekrana* Brdt. *amiralis* Wts. paratype ♀, Paratype, Brit. Mus. 1971–158 (BMNH). E **Afghanistan**: 2♂, 3♀, Sarobi, 1100 m, 25.iv, 7, 10, 10, 11.x.1961, leg. G. Ebert, Ratzel slides nos GU12208/1w, GU12208/2w, GU9208/5m (SMNK).

This small yellowish or pale ochreous species is distributed from steppen chalk hills in Orenburg province in the southeastern European Russia in the north (Mironov 2003) to Saudi Arabia in the south (Wiltshire 1986). It is known also in the eastern provinces of Turkey, in Armenia, Azerbaijan, and Iran. A new species for the fauna of Afghanistan. The male and female genitalia were described and illustrated by Vojnits (1982a) under names *E. idonea*, *E. stulta*, and *E. commenticia* – three synonyms of the same species in one publication.

Remarks. The full type series of this species was not marked by Brandt with original labels "holotype", "paratype" or "syntype". There are additional labels only with inscription "*mekrana*" by pencil.

Eupithecia variostrigata Alphéraky, 1876

Eupithecia variostrigata Alphéraky, 1876: Horae Societatis entomologicae Rossicae **10**: 40. Holotype ♂ (not traced), Russia: Taganrog.

Eupithecia albosparsata Joannis, 1891: Bulletin de la Société entomologique de France **6**: 81. Syntypes 2, including ♂ (MNHN), Turkey: Césarée (synonymised in Mironov 2003).

[*Eupithecia*] *variostrigata* f. *designata* Dietze, 1913: Biologie der Eupithecien **2**: 49; ibidem (1910), **1**: taf. 73, figs 339, 340 (without name of form). Syntypes, including ♂ (coll. K. Dietze in MNHU), Caucasus [Azerbaijan]: Ordubad.

Incorrect subsequent spelling: *artemesiata*: Scoble & al. (1999).

Material. Syntypes of *E. albosparsata*: 1♂, **Turkey**, Césarée, *albosparsata* L. de Joann., Syntype, *variostrigata* Alph. (t-Halict.), 1920–1932 coll. L. & J. De Joannis, Muséum Paris, Fig. par J. Culot, Noct. et Géom. d'Europe, Pl. 41, fig. 849, P. Leraut det. prēp. n° 11850, *Eupithecia albosparsata* ♂; 1♂ ?, Césarée, *Eupithecia albosparsata* De Joannis, 1891, Syntype, 1920–1932 coll. L. & J. De Joannis, Muséum Paris (MNHN). E **Afghanistan**: 1♂, Nurisan-Bashgal, vic. Barg-e-Matal, 2000 m, 21 km S, 25.x.1970, Nr. 1144, leg. C. Naumann E-lep 209, prep. Ratzel 2008 (SMNK).

A new species for the fauna of Afghanistan. It is a widespread western Palaearctic species occurring from Spain in the west to western Pamirs in the east. The holotype of *E. variostrigata*, which was illustrated by Dietze (1906, 1910), could not be found in any of the studied museum collections.

Eupithecia subpulchrata Alphéraky, 1883 **Fig. 15**

Eup[*ithecia*] *subpulchrata* Alphéraky, 1883: Horae Societatis entomologicae Rossicae **17** (3/4): 221, pl. 8, fig. 75. Holotype ♂ (not traced), [China]: Ili (region), Kouldjà [= Kuldja] [Yining (Gulja)].

Material. **Afghanistan**: 1♀, Salang-Pass, N-Seite, (Khinjan), 2100 m, 5–11.vii.1966, G. Ebert leg., Vojnits slide no. 19553♀; 1♀, NE Afghanistan, Prov. Badakhshan, 1750 m, 12 km NE of Baharak: Pejuj, 27.vi.1971, UV-Li, Ebert & Naumann, coll. Nr. 224, Ratzel slide no. GU25408/1w (SMNK).

This handsome species from the *gueneata* group was described on the basis of a single male specimen from northwestern China. It was also known from Turkmenistan, Uzbekistan, and southern Kazakhstan. Not previously recorded from Afghanistan. The details of the male genitalia were described and illustrated by Petersen (1910) for the

first time on the basis of one specimen from the Dietze collection. Habitus of the type specimen of *E. subpulchrata* from Saint-Petersburg Museum was illustrated by Dietze (1906, 1910). However, Alphéraky's type was not found in the Dietze collection in MNHU nor some other European museums, such as ZISP and BMNH. The details of the bursa copulatrix were described and illustrated in Viidalepp (1988) from a specimen from southern Kazakhstan.

Eupithecia vulgata (Haworth, 1809)

Phalaena vulgata Haworth, 1809: Lepidoptera Britannica (**2**): 359. Syntype(s) (BMNH), [Great Britain].
Eupithecia lepsaria Staudinger, 1882: Stettiner Entomologische Zeitschrift **43** (1–3): 74. Syntypes 2♂ (coll. O. Staudinger in MNHU), [Kazakhstan]: Lepsa (treated as subsp. of *Eupithecia vulgata* in Mironov 1989a).

Material. Syntypes of *E. lepsaria*: 1♂, **Kazakhstan**, Lepsa Hbhr., *lepsaria* ♂, Origin., Gen. vérifiés 1454/1 *Eupithecia lepsaria* Stgr. ♂, Lepsa, dét. E. De Laever 1954 (coll. O. Staudinger in MNHU); 1♂, *lepsaria* ♂ Lepsa, Origin., bon. sp. bei *Vulgata* nicht *gueneata* (Boh.), Vojnits slide no. 19034♂ (coll. O. Staudinger in MNHU). **Afghanistan**: 4 exx., Paghman, 30 km NW v. Kabul, 2500 m, 29.vi–8.vii.1963, 20. u 28.vi.1965, 5.vii.1965, Kasy & Vartian (HNHM); 8♂, 1♀, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 14–23.vi.1966, 21.vi–1.vii.1969, G. Ebert leg., Vojnits slides nos 17554♂, 17555♂, 17556♂, 17557♂, 17558♂, 19528♂, 19538♂, 19539♂, 19525♀ (SMNK); 4 exx., same locality, 21.vi–1.vii.1969, leg. Vartian (HNHM); 1♂, same locality, 4.vii.1967, M. Müller leg.; 1♀, 3 exx. (all destroyed), E Afghanistan, Prov. Bamian, vic. Panjao, 2300 m, 27.vi.1970, Nr. 1083, leg. C. Naumann E-lep 209, prep. Ratzel, Ratzel slide no. GU24408/3w; 1♀, NE Afghanistan, Wakhan-Tal, 3300 m, Zemestani Baharak, 10.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242 (SMNK).

This is a widespread and common Palaearctic species ranging from the Atlantic coast of Ireland and Portugal in the west across Europe, Mid-East and Central Asia to the Far East of Russia (Priamurje) and Korea in the east. Not hitherto known from Afghanistan.

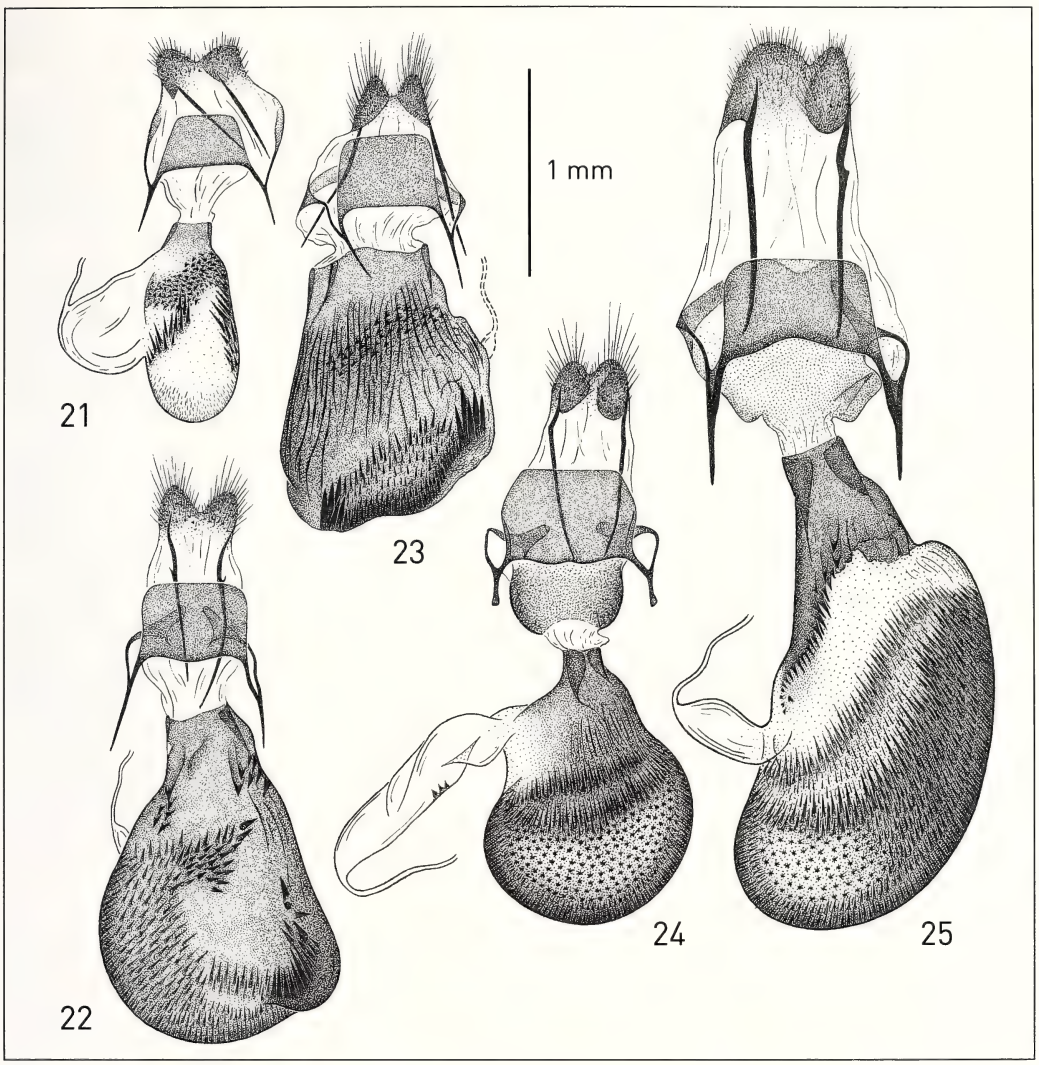
The specimens from Central Asia externally do not differ from European specimens except that they are usually darker, blackish grey or brown coloured. Both male and female genitalia of adults from Afghanistan and adjacent areas are very similar to those from European specimens. The details of the male and female genitalia were described and illustrated in Petersen (1910) for the first time and after that in many other publications of European authors.

Eupithecia ochrovittata Christoph, 1887 — Figs 16, 20

Eupithecia ochrovittata Christoph, 1887: in N. M. Romanoff, Mémoires sur les Lépidoptères **3**: 7, pl. 1, fig. 3. Lectotype ♀, herewith designated to stabilize nomenclature (ZISP), [Armenia]: Erivan.

Material. Lectotype (abdomen lost) ♀, **Armenia**, Erivan ♀, 12.vii.1881 Chr., 16, Coll. Vel. Knjazja Nikolaja Mikhailovicha, Lectotypus ♀ *Eupithecia ochrovittata* Christoph, 1887, design. V.G. Mironov, 2011 (ZISP). E **Afghanistan**: 1♂, Pol-i-Charchi, 18 km E of Kabul, 1700 m, 25.vi–3.vii.1966, H. G. Amsel leg., Vojnits slide no. 19551♂ (SMNK).

This rare species of *Eupithecia* was previously only recorded from Transcaucasus (Georgia and Armenia). The finding of *E. ochrovittata* in Afghanistan was quite unexpected. The single Afghanian specimen is smaller (wingspan 17.5 mm) than the transcaucasian specimens. It is worn but with visible distinctive dark costal margins, distinct small discal dots and the rest of the surface colour in the forewings, as well as with pale, dirty white hindwings. The type specimen of this species was figured in the third volume of Romanoff's series of book (1887) and afterwards illustrated by Dietze (1906, 1910)



Figs 21–25. Female genitalia of *Eupithecia* species (scale bar = 1 mm). **21.** *E. tabestana* Mironov & Ratzel, sp. n. **22.** *E. obtinens* Brandt, 1941. **23.** *E. fredi* Mironov & Ratzel, sp. n. **24.** *E. incurvaria* Hampson, 1903. **25.** *E. naumanni* Mironov & Ratzel, sp. n.

as well. The male of *E. ochrovittata* was previously unknown. We therefore include a description and illustration of the male genitalia.

Male genitalia (Fig. 20). Uncus relatively small, short and narrow, biapical. Valva shaped like a lemon segment slightly arched near base of dorsal margin, with evenly curved ventral margin and broadly rounded, rather obtuse apex; sacculus slightly sclerotized. Vinculum short and narrow, tapering anteriorly. Papillae on the anterior arms of the labides medium-sized, covered with short setae at apices. Phallus slim, short and narrow, narrowing anteriorly, shorter than valval length. Vesica covered with numerous denticules and armed with one horse-shoe-shaped cornutus. Sternite A8 peg-like, evenly tapered to apex and sclerotized near it; basal emargination relatively shallow.

Eupithecia exactata Staudinger, 1882

Eupithecia exactata Staudinger, 1882: Entomologische Zeitschrift, Stettin **43** (1–3): 78. Syntypes 1♂, 2♀ (coll. O. Staudinger in MNHU), [Kazakhstan]: Saisan.

Eupithecia exactata f. *modesta* Dietze, 1910: Biologie der Eupithecien **1**, pl. 73, fig. 380. Holotype ♂ (coll. K. Dietze in MNHU), [China]: Aksu, Makan-Wüste [Korla, Sai-chin on the label].

Eupithecia procera Vojnits, 1982: Acta Zoologica Academiae Scientiarum Hungaricae **28** (3–4): 418, fig. 20. Holotype ♂ (HNHM), East Turkestan [Kyrgyzstan]: Prov. Semirechgensee, Fort-Naryne. **Syn. n.**

Eupithecia opulenta Vojnits, 1982: Acta Zoologica Academiae Scientiarum Hungaricae **28** (3–4): 420, fig. 21. Holotype ♀ (HNHM), East Turkestan [Kyrgyzstan]: Prov. Semirechgensee, Fort-Naryne (synonymised in Mironov 1991).

Eupithecia subolivacea Inoue, 1996: Transactions of the Lepidopterological Society of Japan **47** (4): 241, figs 7, 14. Holotype ♀ (coll. H. Inoue in BMNH), Pakistan: Gilgit (synonymised in Mironov et al. 2008b).

Material. Syntypes: 1♂, **Kazakhstan**, *exactata* ♂ Saisan, Origin., Gen. vérifiés 1456/1 *Eupithecia exactata* Stgr. ♂, Saisan, dét. E. De Laever 1954 (coll. O. Staudinger in MNHU); 1♀, Saisan, Origin., gehört ui den Náhe der *Gratiosata* HS. Boh., *exactata* Stgr. det. E. Schütze, Kassel (coll. O. Staudinger in MNHU); 1♀, Saisan Hbhr., Origin., *Exactata* Stgr ♀, Boh. Schakuh, *exactata* Stgr. det. E. Schütze, Kassel (coll. O. Staudinger in MNHU). – Holotype of *E. exactata* f. *modesta* ♂, **China**, Korla, Sai-chin, ? *exactata* forma: *modesta* Typ., Korla. (380), Zool. Mus. Berlin, Typus *exactata* Stgr. det. E. Schütze, Kassel, Gen.-Unters. Nr. [Schmidt slide no.] Eu 113a, Zool. Mus. Berlin (coll. K. Dietze in MNHU). – Holotype of *E. procera* ♂, **Kyrgyzstan**, Turkestan Oriental, Fort Naryne, Prov. Semirechgensee, S. Akulin 1910–1911, Holotypus *Eupithecia procera* Vojnits, 1981, Gen. 892♂ det. Vojnits A. (HNHM). – Holotype of *E. opulenta* ♀, **Kyrgyzstan**, Turkestan Oriental, Fort Naryne, Prov. Semirechgensee, S. Akulin 1910–1911, Holotypus *Eupithecia opulenta* Vojnits, 1981, Gen. 891♀ det. Vojnits A. (HNHM). – Holotype of *E. subolivacea* ♀, **Pakistan**, Gilgit, Alt. 1600 m, 17.vii.1990, F. Aulombard et J. Plante leg., BM Geom. slide no. 19217 (coll. H. Inoue in BMNH). NE **Afghanistan**: 1♂, Badachschan, Anjuman Dorf, 3000 m, 20–27.vii.1961, Ratzel slide no. GU13312/2m; 1♂, Anjuman Pass, 3990–4300 m, 10.vii.1963, leg. K. Omoto; 1♀, Badakshan m., Bela Kuran, 2900 m, 12–29.vii.1961, leg. K. Omoto, Ratzel slide no. GU12312/2w (ZSM); 1♂, 2♀, Wakhan-Tal, 3300 m, Zamestani Baharak, 10.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242, Ratzel slide no. GU14208/1 (SMNK, coll. Ratzel); 1♀, same locality, 23.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 261, Ratzel slide no. GU9208/4w; 11♂, 7♀, same locality, Sargaz, 2930 m, 11.viii.1971, UV-Li, Ebert & Naumann, coll. Nr. 290 (SMNK); 3♂, 1♀, C Afghanistan, Koh-i-Baba, S-Seite, Panjao, 2650 m, 20–22. vii.1966, G. Ebert leg., Vojnits slides nos 17772♂, 17773♂, 19518♂, 17775♀ (SMNK)

This is a common Asian mountainous species, widespread in northern Iran (Shahkuh Mts.), Kyrgyzstan, Tajikistan, Pakistan/India (Jammu & Kashmir), southeastern regions of Kazakhstan, northwestern provinces of China (Xinjiang), and in Mongolia. Not previously recorded from Afghanistan. The male and female genitalia were described and illustrated in De Laever (1956) for the first time.

Eupithecia nephelata Staudinger, 1897

Eupithecia nephelata Staudinger, 1897: Deutsche entomologische Zeitschrift, Iris **9** (2): 282. Syntypes 1♂, 1♀ (coll. O. Staudinger in MNHU), [Mongolia]: Uliassutai, Tumartin-Gol.

Material. Syntypes: 1♂, **Mongolia**, Uliassutai, 94, Led., *Nephelata* Stgr., Origin., Gen. vérifiés 1441/4 *Eupithecia nephalata* Stgr. [sic.] ♂, dét. E. De Laever 1954; 1♀, Uliassutai, 94, Led., *nephelata* ♀, Origin., Gen. vérifiés 1441/5 *Eup. nephalata* Stgr. [sic.] ♀, dét. E. De Laever 1954 (coll. O. Staudinger in MNHU). NE **Afghanistan**: 1♂, Wakhan-Tal, Langar, 3500 m, 11.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 243; 1♀, same locality, 3300 m, Zemestani Baharak, 10.vii.1971, UV-Li, Ebert & Naumann, coll. Nr. 242, Ratzel slide no. GU14208/2w (SMNK).

This pale-coloured Central Asian species has previously been recorded from Kyrgyzstan, Tajikistan, Pakistan/India (Jammu and Kashmir), western China (Xinjiang), and Mongolia. It is a new species for the fauna of Afghanistan. The moth is externally rather similar to the preceding species and was illustrated in Dietze (1910) and later in

Mironov et al. (2008c). The male and female genitalia were described and illustrated by De Laever (1956) for the first time.

Eupithecia marginata Staudinger, 1892

Eup[*ithecia*] *marginata* Staudinger, 1892: Deutsche entomologische Zeitschrift, Iris **5** (1): 257. Syntypes 2♂, 4♀ (coll. O. Staudinger and K. Dietze in MNHU), [China]: Kuldja-Gebiet.
Incorrect subsequent spelling: *marginita*: De Laever (1956).

Material. Syntypes: 1♂, **China**, Kuldja Rkbl. 84, *marginata* Stgr., Origin., Gen. vérifiés 1451/3 *Eupithecia marginata* Stgr. ♂, Kuldja 84, dét. E. De Laever 1954; 1♀, *marginata* ♀ Kuldja, Origin., Gen. vérifiés 1451/4 *Eupithecia marginata* ♀, Kuldja, dét. E. De Laever 1954; 3♀, [small brownish circular label], Origin. (coll. O. Staudinger in MNHU). **Afghanistan**: 4♂, Paghman, 30 km NW v. Kabul, 2100–2200 m, 20–30.vii.1962, E. & A. Vartian leg., Vojnits slide no. 15110♂ (HNHM); 1♀, SE Afghanistan, Safed Koh, S-Seite, Kotkai, 2350 m, 4.viii.1967, M. Müller leg., Vojnits slide no. 19537♀ (SMNK).

E. marginata is a western Asian species ranging from Cyprus in the west through North Caucasus (Daghestan), Armenia, Azerbaijan, Iran, Uzbekistan, Tajikistan, and Kyrgyzstan to southeastern Kazakhstan (Tien-Shan Mts.) and northwestern province of China (Xinjiang) in the east. Not previously recorded from Afghanistan.

This species is externally very similar to the British nominate subspecies of *E. vulgata* (Haworth, 1809). Based on the structure of the male and female genitalia, it belongs to the *semigraphata* group (Schütze 1956). The female genitalia were described and illustrated in Petersen (1910) for the first time, and after that the genitalia of both sexes were pictured in the publications of De Laever (1956) and Viidalepp (1988).

Eupithecia exicterata Mironov & Ratzel, 2008

Eupithecia exicterata Mironov & Ratzel, 2008: Transactions of the Lepidopterological Society of Japan **59** (3): 220, figs 16, 24, 25. Holotype ♂ (ZFMK), Pakistan: Hindukush Mts., 5 km E of Shandur pass, 72°38'E, 36°07'N, 3250 m.

Material. Holotype ♂, **Pakistan**, Hindukush Mts., 5 km E of Shandur pass, 72°38'E, 36°07'N, 3250 m, 24–25.vi.2000, leg. Z. Varga & G. Ronkay (ZFMK). – Paratypes: 3♂, same data (ZFMK, ZISP). 2♀, **India**, J & K, Kashmir, vic. Sonamarg, 2900 m, 13.viii.1988, leg. W. Thomas (ZFMK, ZISP); 1♀, Indien Uttar Pradesh, Gangotri, *ca* 3000 m, 6–9.viii.1993, Kautt & Weisz, Ratzel slide no. GU12905/1w (SMNS). 1♀, **Pakistan**, Karakoram Mts., Naltar valley, 74°09'22"E, 36°11'08"N, 2900 m, 20.vii.1998, leg. G. Csorba & L. Ronkay (HNHM); 1♂, 1♀, same data, 2800 m, 74°12'E, 36°09.6'N, respectively 18.vii.1998, leg. G. Csorba & L. Ronkay, slide ACG GL37 and 14.viii.1998, leg. Z. Varga & G. Ronkay, slide ACG GL16 (coll. László); 3♂, 3♀, Pakistan-West, Great Himalaya Mts., near Gabar, 3200 m, 21–24.viii.2004, leg. V. Gurko, Ratzel slides nos GU8705/1w, GU8705/2m, GU8705/3w (coll. Ratzel). SE **Afghanistan**: 1♀, Safed Koh, S-Seite, Kotkai, 2350 m, 20.vii.1968, M. Müller leg., Vojnits slide no. 19506♀ (SMNK).

This species, which is similar externally to *E. icterata* f. *subfulvata* (Haworth, 1809), was recently described on the basis of a large series, including 16 specimens from the western Himalayas (Pakistan and India). A single worn female was found in the Afghanian material of *Eupithecia* in SMNK.

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München, Germany and Museum für Naturkunde, Zentralinstitut der Humboldt-Universitat zu Berlin, Germany. We are grateful also to Dr. L. Ronkay (HNHM, Budapest), Dr. J. Viidalepp (IAET, Tartu) and Dr. D. Stüning (ZFMK, Bonn) for kind support of the first author when visiting respectively the Termeszettudomanyi Muzeum Allattara (Hungarian Natural History Museum), Budapest, Hungary, Institute of Agriculture and Environment, Estonian Agricultural University, Tartu, Estonia, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany. We are grateful to Dr. B. Gustafsson (NHRS, Stockholm) for geneorous loan of type-material and to Dr. A. Hausmann (ZSM, Munich), Dr. S. Gaal-Haszler (NHMW, Vienna) and Dr. L. Ronkay (HNHM, Budapest) for loan of material. Thanks are also due to the Deutsche Forschung Gemeinschaft (DFG grants nos 436 RUS 17/99/02; STU 498/2–1 and TR 1086/1–1) which enabled Dr. V. Mironov to do extensive studies on Asian Eupitheciini in ZFMK (Bonn), MNHU (Berlin) and SMNK (Karlsruhe) in 2003, 2009 and 2011, and to the Royal Society, London, who provided a grant to enable Dr. V. Mironov to work in BMNH (London) in 2006. We acknowledge Dr. L. Kaila (Finnish Museum of Natural History, Helsinki) and an anonymous reviewer for helpful comments on the manuscript.

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